

## SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Susy Tsang-Foster Examiner #: 76063 Date: 6/7/04  
Art Unit: 1745 Phone Number 301-272-1293 Serial Number: 10/080,515  
Mail Box and Bldg/Room Location: REMSFN Results Format Preferred (circle) PAPER DISK E-MAIL  
6D 75

If more than one search is submitted, please prioritize searches in order of need.

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Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Fluoroalkyl phosphate salts, and process for the preparation of these substances  
Inventors (please provide full names): Please see attached list

Earliest Priority Filing Date: Feb 25, 2002

\*For Sequence Searches Only\* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

Please search the fluoroalkylphosphate salt given by the general formula (I) of attached claim 1. Please focus on the structure of the anion. Please do not limit what the identity of the cation  $M^{a+}$  can be unless there are too many results. However, the  $M^{a+}$  cation must be a monovalent, divalent, or trivalent cation. If there are too many results, please limit the cation  $M^{a+}$  to be the following:

- (1) an alkali metal cation; (2) magnesium cation; (3) aluminum cation; (4)  $[N(R^7)_4]^+$  wherein  $R^7$  is as defined respectively in the claims; (5)  $[P(R^7)_4]^+$  wherein  $R^7$  is as defined respectively in the claims; (6)  $[P(N(R^7)_2)_4]^+$  wherein  $R^7$  is as defined respectively in the claims; (7)  $[C(N(R^7)_2)_3]^+$  wherein  $R^7$  is as defined respectively in the claims; (8) heteroaromatic cation of formula (II); (9) heteroaromatic cation of formula (III); (10) heteroaromatic cation of formula (IV); (11) heteroaromatic cation of formula (V); (12) heteroaromatic cation of formula (VI); (13) heteroaromatic cation of formula (VII); (14) heteroaromatic cation of formula (VIII); (15) heteroaromatic cation of formula (IX); (16) nitrosyl cation; and (17) nitril cation.

Please see attached list of claims for the formulas. Thank you.

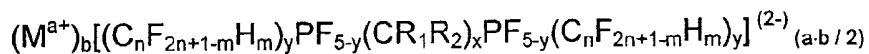
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	Type of Search	Vendors and cost where applicable
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Date Completed: <u>6-9-04</u>	Litigation _____	Lexis/Nexis _____
Searcher Prep & Review Time: <u>15</u>	Fulltext _____	Sequence Systems _____
Clerical Prep Time: _____	Patent Family _____	WWW/Internet _____
Online Time: <u>35</u>	Other _____	Other (specify) _____

## PATENT CLAIMS

1. A fluoroalkylphosphate salt of formula (I)



(I)

wherein

$M^{a+}$  is a monovalent, divalent or trivalent cation;

a is 1, 2 or 3;

b is 2 for a = 1,

b is 2 for a = 3, and

b is 1 for a = 2;

and, in each case, subscripts n, m, x and y satisfy the following relationships

$$1 \leq n \leq 8,$$

$$0 \leq m \leq 2 \text{ for } n = 1 \text{ or } 2,$$

$$0 \leq m \leq 4 \text{ for } 3 \leq n \leq 8,$$

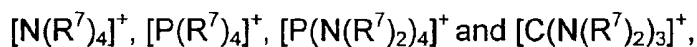
$$1 \leq x \leq 12,$$

$$0 \leq y \leq 2,$$

where  $R_1$  and  $R_2$  are each independently, fluorine, hydrogen, alkyl having 1 to 8 carbon atoms, fluoroalkyl having 1 to 8 carbon atoms or perfluoroalkyl having 1 to 8 carbon atoms; and

wherein the substituents ( $C_nF_{2n+1-m}H_m$ ) are in each case identical or different.

2. A fluoroalkylphosphate salt according to Claim 1, wherein the cation  $M^{a+}$  is an alkali metal cation.
3. A fluoroalkylphosphate salt according to claim 2, wherein cation  $M^{a+}$  is a lithium, sodium or potassium cation.
4. A fluoroalkylphosphate salt according to Claim 3, wherein the cation  $M^{a+}$  is a lithium cation.
5. A fluoroalkylphosphate salt according to Claim 1, wherein the cation  $M^{a+}$  is a magnesium or aluminum cation.
6. A fluoroalkylphosphate salt according to Claim 1, wherein the cation  $M^{a+}$  is an organic cation
7. A fluoroalkylphosphate salt according to Claim 6, wherein the cation  $M^{a+}$  is a nitrosyl cation, a nitryl cation or an organic cation selected from the formulae



wherein  $R^7$ , in each case independently, is

H,  $C_{1-10}$ -alkyl or A,

where one or more H atoms in the C<sub>1-10</sub>-alkyl chain may each individually be replaced by fluorine, an aromatic radical which optionally contains one or more heteroatoms, or a cycloalkyl radical which optionally contains one or more heteroatoms, and/or one or more C atoms in the alkyl chain may be each individually replaced by a heteroatom, and

A is an aromatic or cycloaliphatic radical, in each case optionally containing one or more heteroatoms.

8. A fluoroalkylphosphate salt according to claim 7, wherein A is in each case a 5- or 6-membered aromatic radical which optionally contains nitrogen, sulfur and/or oxygen atoms, or a cycloalkyl radical having 5 or 6 members.

9. A fluoroalkylphosphate salt according to claim 8, wherein A is phenyl or pyridyl.

10. A fluoroalkylphosphate salt according to Claim 6, wherein the M<sup>a+</sup> is a nitrosyl cation, a nityl cation or an organic cation selected from the formulae



wherein R<sup>7</sup> are in each case, independently, are

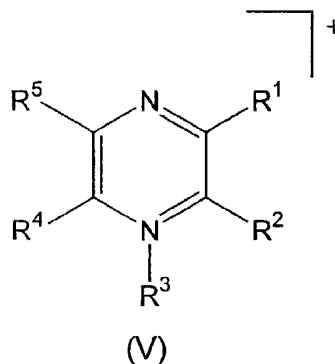
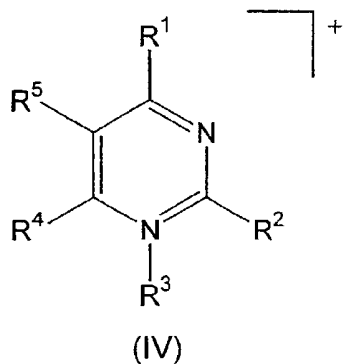
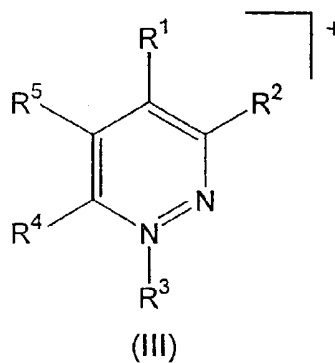
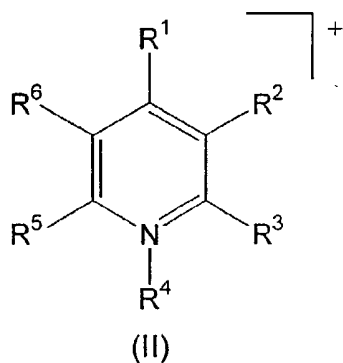
H, C<sub>1-10</sub>-alkyl or A,

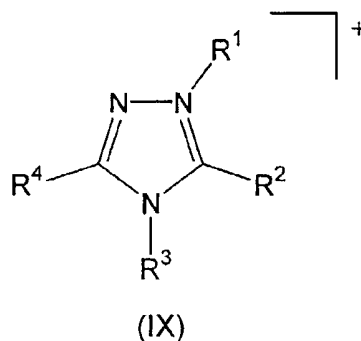
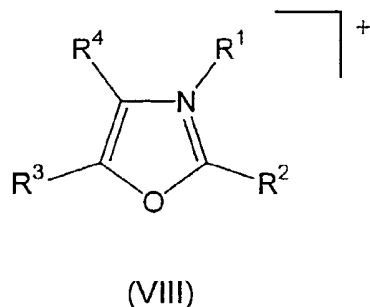
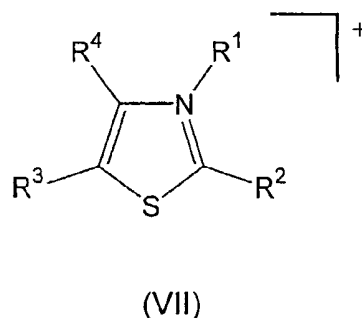
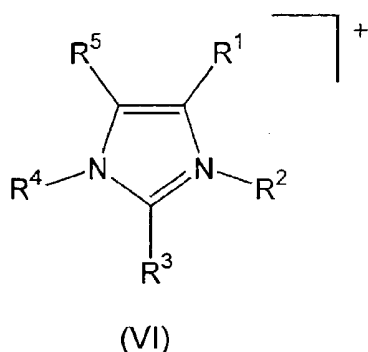
where one or more H atoms in the C<sub>1-10</sub>-alkyl chain may each individually be replaced by fluorine, a 5- or 6- membered aromatic radical which optionally contains one or more heteroatoms selected from N, O and S,

or a 5- or 6- numbered cycloalkyl radical which optionally contains one or more heteroatoms selected from N, O and S, and/or one or more C atoms in the C<sub>1-10</sub>-alkyl chain may be each individually replaced by oxygen, and

5 A is an aromatic or cycloaliphatic radical, in each case optionally containing one or more heteroatoms.

11. A fluoroalkylphosphate salt according to Claim 1, wherein M<sup>a+</sup> is a heteroaromatic cation of formulae (II) to (IX)





wherein

$R^1$  to  $R^6$  are each independently, H, halogen, or a  $C_{1-8}$ -alkyl radical which is optionally substituted by F, Cl,  $N(C_rF_{(2r+1-s)}H_s)_2$ ,  $O(C_rF_{(2r+1-s)}H_s)$ ,  $SO_2(C_rF_{(2r+1-s)}H_s)$  or  $C_rF_{(2r+1-s)}H_s$ , in which  $1 \leq r \leq 6$  and  $0 \leq s \leq 13$ , and  $2r+1-s \geq 0$ , or

one or more adjacent pairs of  $R^1$  to  $R^6$  can together be a  $C_{1-8}$ -alkylene radical which is optionally substituted by F, Cl,  $N(C_rF_{(2r+1-s)}H_s)_2$ ,

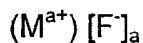
$O(C_rF_{(2r+1-s)}H_s)$ ,  $SO_2(C_rF_{(2r+1-s)}H_s)$  or  $C_rF_{(2r+1-s)}H_s$ , in which  $1 \leq r \leq 6$  and  $0 \leq s \leq 13$ , and  $2r+1-s \geq 0$ ,

where each of  $R^1$  to  $R^6$  cannot be halogens if they are bonded directly to nitrogen.

12. A fluoroalkylphosphate salts according to Claim 10, wherein  $R^1$  to  $R^6$  are each independently H, fluorine, or a  $C_{1-8}$ -alkyl radical which is optionally substituted by F, Cl,  $N(C_rF_{(2r+1-s)}H_s)_2$ ,  $O(C_rF_{(2r+1-s)}H_s)$ ,  $SO_2(C_rF_{(2r+1-s)}H_s)$  or

$C_rF_{(2r+1-s)}H_s$ , in which  $1 \leq r \leq 6$ , or  $0 \leq s \leq 2r+1$ , and  $2r+1-s \geq 0$ , and where each of  $R^1$  to  $R^6$  cannot be fluorine if they are bonded directly to nitrogen.

- 5 13. A fluoroalkylphosphate salt according to Claim 1, wherein  $1 \leq n \leq 6$ .
14. A fluoroalkylphosphate salt according to Claim 13, wherein  $1 \leq n \leq 3$ .  
 $1 \leq x \leq 4$ .
15. A fluoroalkylphosphate salt according to Claim 1, wherein  $1 \leq x \leq 8$ .
- 10 16. A fluoroalkylphosphate salt according to Claim 15, wherein  $1 \leq x \leq 4$ .
17. A fluoroalkylphosphate salt according to Claims 1, wherein  $m = 0$ .
- 15 18. A fluoroalkylphosphate salt according to Claim 1, wherein  $y = 2$ .
19. A fluoroalkylphosphate salt according to Claim 1, wherein  $R_1$  and  $R_2$  are each fluorine.
- 20 20. A fluoroalkylphosphate salt according to Claim 1, wherein said salt is  
  
 $(Li^+)_2[(C_2F_5)_2PF_3(CF_2)_2PF_3(C_2F_5)_2]^{(2-)}$   
or  
 $(N(C_2H_5)_4^+)_2[(C_2F_5)_2PF_3(CF_2)_2PF_3(C_2F_5)_2]^{(2-)}$
- 25 21. A process for the preparation of a fluoroalkylphosphate salt according to Claim 1, comprising:  
reacting at least one fluoro- $\alpha,\omega$ -  
bis[(fluoroalkyl)fluorophosphorano]alkane with at least one fluoride salt  
30 of the formula (X)



$$(X)$$

5 in which  $(M^{a+})$  and  $a$  are as defined in Claim 1, in solution to obtain a fluoroalkylphosphate salt of the formula (I), and said salt is optionally, purified and/or isolated.

22. A process according to Claim 21, wherein said at least one fluoro- $\alpha,\omega$ -  
10 bis[(fluoroalkyl)fluorophosphorano]alkane is a compound of formula (XI)



$$(XI)$$

15 in which

$1 \leq n \leq 8$ ,  $0 \leq m \leq 2$  for  $n = 1$  or  $2$ ,  $0 \leq m \leq 4$  for  $3 \leq n \leq 8$ ,  $1 \leq x \leq 12$ ,  
20  $0 \leq y \leq 2$ ,

$R_1$  and  $R_2$  are each, independently, fluorine, hydrogen, alkyl having 1 to 8 C atoms, fluoroalkyl having 1 to 8 C atoms or perfluoroalkyl having 1 to 8 C atoms, and

substituents  $(C_nF_{2n+1-m}H_m)$  are in each case identical or different.

25 23. A process according to Claim 21, wherein the compound of the formula (X) is employed in an excess of up to 10 fold, based on the amount of fluoro- $\alpha,\omega$ -bis[(fluoroalkyl) fluorophosphorano]alkane(s).

30 24. A process according to one of Claim 21, wherein the reaction with the compound of formula (X) is carried out at a temperature of  $-35$  to  $+80^\circ\text{C}$ .



25. A process according to one of Claim 21, wherein that the solvent employed is ethylene carbonate, propylene carbonate, butylene carbonate, dimethyl carbonate, diethyl carbonate, ethyl methyl carbonate, methyl propyl carbonate, methyl formate, ethyl formate, methyl acetate, ethyl acetate, methyl propionate, ethyl propionate, methyl butyrate, ethyl butyrate,  $\gamma$ -butyrolactone, diethyl ether, dimethoxyethane, diethoxyethane, dimethylformamide or dimethylacetamide, dimethyl sulfoxide, dimethyl sulfide, diethyl sulfide propane sulfone, acetonitrile, acrylonitrile, propionitrile, acetone, or an at least partially fluorinated derivative of any of these solvents, or a mixture of at least two of these solvents and/or fluorinated derivatives of these solvents.
26. A mixture comprising:
- a. at least one fluoroalkylphosphate salt according to Claim 1, and
  - b. at least one polymer.
27. A mixture according to Claim 26, comprising 5 to 90% by weight of component a) and 95 to 5% by weight of component b), based on the sum of components a) and b).
28. A mixture according to claim 25, wherein component b) is a homopolymer or copolymer of acrylonitrile, vinylidene difluoride, methyl methacrylate, tetrahydrofuran, ethylene oxide, siloxane, phosphazene or a mixture of at least two of these homopolymers and/or copolymers.
29. A mixture according to Claim 28, wherein b) is a homopolymer or copolymer of vinylidene difluoride, acrylonitrile, methyl methacrylate or tetrahydrofuran.

30. A mixture according to Claim 25, wherein said polymer is at least partially crosslinked.
- 5 31. A mixture according to Claim 25, wherein said it additionally comprises at least one solvent.
- 10 32. A mixture according to Claim 31, wherein said solvent is ethylene carbonate, propylene carbonate, butylene carbonate, dimethyl carbonate, diethyl carbonate, ethyl methyl carbonate, methyl propyl carbonate, methyl formate, ethyl formate, methyl acetate, ethyl acetate, methyl propionate, ethyl propionate, methyl butyrate, ethyl butyrate,  $\gamma$ -butyrolactone, diethyl ether, dimethoxyethane, diethoxyethane, dimethylformamide, dimethylacetamide, dimethyl sulfoxide, dimethyl sulfide, diethyl sulfide or propane sulfone, acetonitrile, acrylonitrile, acetone, or an at least partially fluorinated derivative of the any of these solvents, or a mixture of at least two of these solvents and/or fluorinated derivatives of these solvents.
- 15 33. (In an electrolyte, primary battery, secondary battery, capacitor, super capacitor or galvanic cell, containing at least one conductive salt, the improvement wherein said salt is a salt according to claim 1, optionally in combination with further conductive salts and/or additives.)
- 20 34. An electrolyte according to Claim 33.
- 25 35. An electrolyte according to Claim 34, wherein the concentration of the fluoroalkylphosphate salt is 0.01 to 3 mol/l.
- 30 36. A primary battery according to Claim 33.

37. A secondary battery according to Claim 33.
38. A capacitor according to Claim 33.
39. A supercapacitor according to Claim 33.
40. A galvanic cell according to Claim 33.

**MERCK-2183**

### Abstract

5 Fluoroalkylphosphate salts of Formula I, described herein, are suitable for use, alone or in mixtures with, e.g., other salts, in electrolytes, primary batteries, secondary batteries, capacitors, supercapacitors or galvanic cells.

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L2 109 S KUHNER ?/AU OR KUH NER ?/AU  
L3 98 S IGNATYEV ?/AU  
L4 1672 S SARTORI ?/AU  
L5 0 S L1 AND L2 AND L3 AND L4  
L6 4 S L1 AND L2  
L7 14 S L1 AND L3  
L8 31 S L1 AND L4  
L9 0 S L2 AND L3  
L10 1 S L2 AND L4  
L11 12 S L3 AND L4  
L12 33 S ?FLUOROALKYLPHOSPHAT?  
L13 5 S (L6-L11) AND L12  
SEL L13 1-5 RN

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L16 STR  
L17 SCR 2040 AND 2127  
L18 50 S L16 AND L17  
L19 STR L16  
L20 4 S L19 AND L17  
L21 STR L19  
L22 4 S L21 AND L17  
L23 123 S L21 AND L17 FUL  
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FILE 'CAOLD' ENTERED AT 13:05:12 ON 09 JUN 2004  
L24 1 S L23

FILE 'ZCA' ENTERED AT 13:05:20 ON 09 JUN 2004  
L25 61 S L23

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L24 ANSWER 1 OF 1 CAOLD COPYRIGHT 2004 ACS on STN

AN CA61:14060c CAOLD

TI hydrotetrafluorotrifluoromethylphosphate anion

AU Cavell, Ronald G.; Nixon, J. F.

IT 19585-44-5

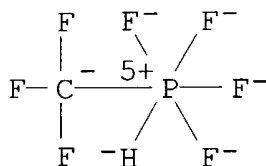
IT 19585-44-5

RN 19585-44-5 CAOLD

CN Phosphate(1-), tetrafluorohydro(trifluoromethyl)-, hydrogen, compd.  
with dimethylamine (1:1) (8CI) (CA INDEX NAME)

CM 1

CRN 44863-52-7  
 CMF C H F7 P . H  
 CCI CCS



● H<sup>+</sup>

CM 2

CRN 124-40-3  
 CMF C2 H7 N



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L25 ANSWER 1 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
 140:166633 On the use of LiPF<sub>3</sub>(CF<sub>2</sub>CF<sub>3</sub>)<sub>3</sub> (LiFAP) solutions for Li-ion  
 batteries. Electrochemical and thermal studies. Gnanaraj, J. S.;  
 Zinigrad, E.; Asraf, L.; Sprecher, M.; Gottlieb, H. E.; Geissler,  
 W.; Schmidt, M.; Aurbach, D. (Department of Chemistry, Bar-Ilan  
 University, Ramat-Gan, 52900, Israel). Electrochemistry  
 Communications, 5(11), 946-951 (English) 2003. CODEN: ECCMF9.  
 ISSN: 1388-2481. Publisher: Elsevier Science B.V..  
 AB Electrolyte solns. comprising a mixt. of LiPF<sub>6</sub> and LiPF<sub>3</sub>(CF<sub>2</sub>CF<sub>3</sub>)<sub>3</sub>

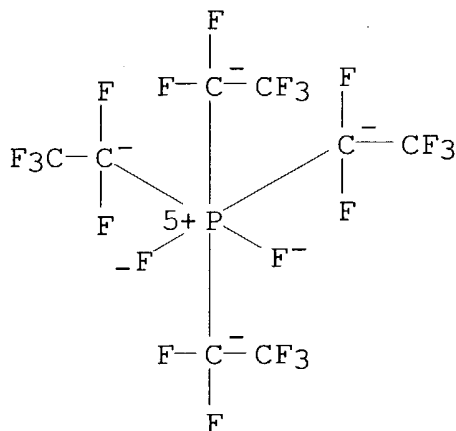
(LiFAP) in alkyl carbonates (ethylene, di-Me and di-Et carbonate) are superior to single salt LiFAP or LiPF<sub>6</sub> solns. for lithium-graphite anodes at elevated temps. Graphite electrodes could be cycled (Li insertion-deinsertion) more than hundred times at 80° with high and stable capacity in the two-salt solns., while in the single-salt solns. this was impossible. Preliminary studies by voltammetry and impedance spectroscopy indicate that the combination of the two salts in soln. has a unique influence on the electrodes surface (not yet defined). Thermal studies by accelerating rate and DSC show that thermal decompn. of LiFAP solns. has a higher onset, but very high heat and pressure developing rates, compared to LiPF<sub>6</sub> solns. The presence of LiPF<sub>6</sub> in LiFAP solns. decreased their self-heating and pressure-developing rates pronouncedly. From product anal. of the thermal reactions by NMR, FTIR and MS, the authors can suggest possible unique bulk reactions that occur in LiPF<sub>6</sub>-LiFAP solns. One of these is a nucleophilic reaction between F<sup>-</sup> and PF<sub>3</sub>(CF<sub>2</sub>CF<sub>3</sub>)<sub>3</sub><sup>-</sup>, which may neutralize the effect of trace HF in solns. (thus forming new P-F bonds and HCF<sub>2</sub>CF<sub>3</sub>). Such a reaction should have a pos. effect on both the performance of the Li-graphite electrodes and the thermal behavior of the solns.

IT 403694-33-7

(electrochem. and thermal studies on use of LiPF<sub>3</sub>(CF<sub>2</sub>CF<sub>3</sub>)<sub>3</sub> (LiFAP) solns. with LiPF<sub>6</sub> for Li-ion batteries)

RN 403694-33-7 ZCA

CN Phosphate(1-), difluorotetrakis(pentafluoroethyl)-, lithium (9CI)  
(CA INDEX NAME)



● Li<sup>+</sup>

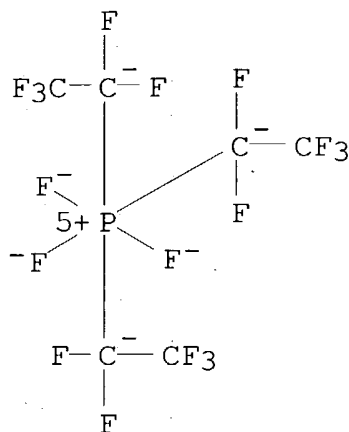
IT 403699-22-9



(electrolyte solns. with carbonates and lithium fluorophosphate salts; electrochem. and thermal studies on use of  $\text{LiPF}_3(\text{CF}_2\text{CF}_3)_3$  (LiFAP) solns. with  $\text{LiPF}_6$  for Li-ion batteries)

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)



●  $\text{Li}^+$

IT 403694-33-7

(electrochem. and thermal studies on use of  $\text{LiPF}_3(\text{CF}_2\text{CF}_3)_3$  (LiFAP) solns. with  $\text{LiPF}_6$  for Li-ion batteries)

IT 403699-22-9

(electrolyte solns. with carbonates and lithium fluorophosphate salts; electrochem. and thermal studies on use of  $\text{LiPF}_3(\text{CF}_2\text{CF}_3)_3$  (LiFAP) solns. with  $\text{LiPF}_6$  for Li-ion batteries)

L25 ANSWER 2 OF 61 ZCA COPYRIGHT 2004 ACS on STN

140:131041 Vinylene Carbonate and Li Salicylatoborate as Additives in  $\text{LiPF}_3(\text{CF}_2\text{CF}_3)_3$  Solutions for Rechargeable Li-Ion Batteries.

Aurbach, D.; Gnanaraj, J. S.; Geissler, W.; Schmidt, M. (Department of Chemistry, Bar-Ilan University, Ramat-Gan, 52900, Israel).

Journal of the Electrochemical Society, 151(1), A23-A30 (English)

2004. CODEN: JESOAN. ISSN: 0013-4651. Publisher: Electrochemical Society.

AB  $\text{LiPF}_3(\text{CF}_2\text{CF}_3)_3$ , (LiFAP) was developed as a new electrolyte that can replace the commonly used  $\text{LiPF}_6$  in Li-ion batteries. Vinylene carbonate (VC) and Li salicylato borate were studied as additives for LiFAP solns. in mixts. of ethylene, di-Me, and di-Et carbonates with composite graphite and  $\text{LiMn}_2\text{O}_4$  electrodes. The tools for this study included voltammetry (fast and slow scan rates),

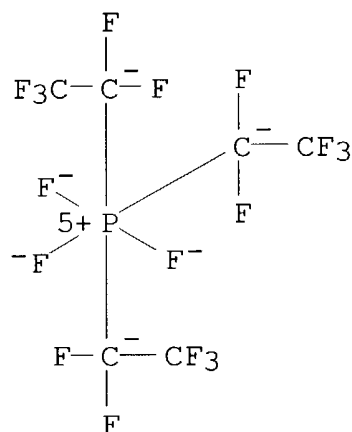
chronopotentiometry, impedance spectroscopy, electron microscopy, FTIR spectroscopy, and XPS. LiFAP solns. contg. VC were superior for both graphite and LiMn2O4 (spinel) electrodes. The effect of additives on electrode performance can be attributed to their impact on the surface chem. of these electrodes.

IT 206057-04-7

(vinylene carbonate and Li salicylatoborate as additives in LiPF3(CF2CF3)3 electrolyte solns. for Li-ion batteries)

RN 206057-04-7 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 206057-04-7

(vinylene carbonate and Li salicylatoborate as additives in LiPF3(CF2CF3)3 electrolyte solns. for Li-ion batteries)

L25 ANSWER 3 OF 61 ZCA COPYRIGHT 2004 ACS on STN

140:130982 Synthesis of new Li-fluoroalkyl phosphates (LiFAPs) for application in Li-cells. Ignat'ev, Nikolai V.; Schmidt, Michael; Kuehner, Andreas; Heider, Udo; Hilarius, Volker; Oesten, Ruediger; Sartori, Peter (Merck KGaA, Darmstadt, D-64271, Germany). Proceedings - Electrochemical Society, 2001-21(Batteries and Supercapacitors), 395-399 (English) 2003. CODEN: PESODO. ISSN: 0161-6374. Publisher: Electrochemical Society.

AB Lithium fluoroalkyl phosphates (LiFAP) are described as a new class of electrolyte salts with remarkable properties for applications in Li cells. While LiFAP electrolytes possess high ionic conductivities close to established LiPF6-based systems, the striking benefits of LiFAP are excellent electrochem. stability in

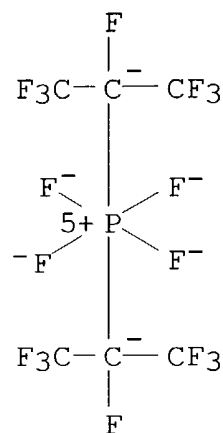
combination with superior stability towards hydrolysis.

IT 205926-54-1P 205926-56-3P 403699-22-9P

(synthesis of new Li-fluoroalkyl phosphates (LiFAPs) for application in Li-cells)

RN 205926-54-1 ZCA

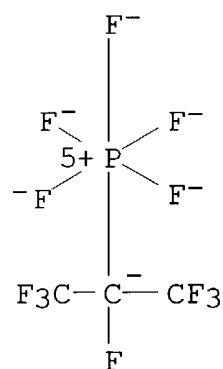
CN Phosphate(1-), tetrafluorobis[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 205926-56-3 ZCA

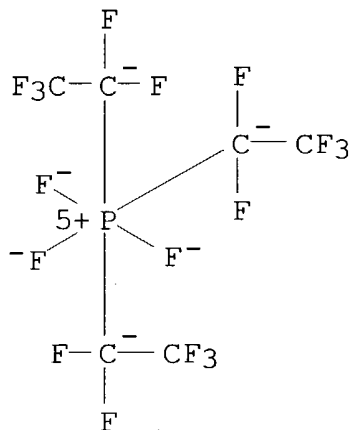
CN Phosphate(1-), pentafluoro[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-, lithium, (OC-6-21)- (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)

● Li<sup>+</sup>

IT 205926-54-1P 205926-56-3P 403699-22-9P

(synthesis of new Li-fluoroalkyl phosphates (LiFAPs) for application in Li-cells)

L25 ANSWER 4 OF 61 ZCA COPYRIGHT 2004 ACS on STN

140:59250 Determination of hydrogen concentration in ionic liquids and the effect (or lack of) on rates of hydrogenation. Dyson, Paul J.; Laurenczy, Gabor; Ohlin, C. Andre; Vallance, James; Welton, Thomas (Ecole Polytechnique Federale de Lausanne, EPFL-BCH, Institut de Chimie Moleculaire et Biologique, Lausanne, CH-1015, Switz.). Chemical Communications (Cambridge, United Kingdom) (19), 2418-2419 (English) 2003. CODEN: CHCOFS. ISSN: 1359-7345. Publisher: Royal Society of Chemistry.

AB The soly. of hydrogen and the corresponding Henry coeffs. for 11 ionic liqs. have been detd. in situ at 100 atm H<sub>2</sub> pressure and are much lower than expected; attempts to correlate the soly. of hydrogen in the ionic liqs. with the rate of reaction for the hydrogenation of benzene to cyclohexane in these solvents have been made.

IT 639092-18-5

(solvent; detn. of hydrogen concn. in ionic liqs. and effect on rates of hydrogenation)

RN 639092-18-5 ZCA

CN Phosphonium, trihexyltetradecyl-, trifluorotris(pentafluoroethyl)pho

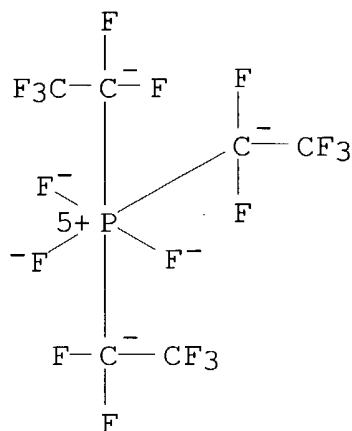
sphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 429679-87-8

CMF C6 F18 P

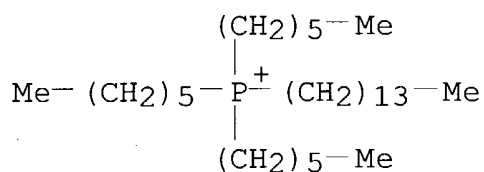
CCI CCS



CM 2

CRN 374683-43-9

CMF C32 H68 P



IT 639092-18-5

(solvent; detn. of hydrogen concn. in ionic liqs. and effect on rates of hydrogenation)

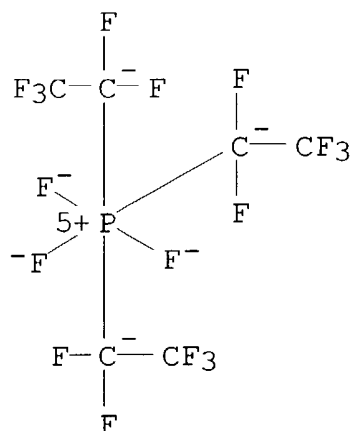
L25 ANSWER 5 OF 61 ZCA COPYRIGHT 2004 ACS on STN

139:326054 Rechargeable lithium cell and lithium battery with improved cycle stability and good high current behavior. Paulsen, Jens M. (Germany). Ger. Offen. DE 10215305 A1 20031023, 16 pp. (German). CODEN: GWXXBX. APPLICATION: DE 2002-10215305 20020408.

AB A lithium cell consists of an anode film, electrolytes and the cathode film, whereby the electrolyte has an improved stability in relation to redn. to lithium intercalating anode. The lithium cell

has an improved cycle stability. The anode film contains an active anode intercalation material with a voltage (vs. Li/Li+) >1 V, preferably .simeq.1.5 V, like Li<sub>4</sub>Ti<sub>5</sub>O<sub>12</sub>. The electrolyte is a water-stable electrolyte salt, dissolved in an electrolyte solvent, which is free from ethylene carbonate and preferable free from noncyclic mols., like acetonitrile or di-Me carbonate. The cathode film contains an active cathode material with a voltage (vs. Li/Li+) >3.5 V. The invention concerns rechargeable lithium cells with improved cycle stability and good high current behavior, used in rechargeable lithium batteries. A preferential implementation of the invention yields large rechargeable lithium batteries, consisting of stacks of bipolar plates switched into row, and lithium batteries with very good high current behavior.

IT 403699-22-9, Lithium trifluorotris(perfluoroethyl)phosphate  
(rechargeable lithium cell and lithium battery with improved cycle stability and good high current behavior)  
RN 403699-22-9 ZCA  
CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 403699-22-9, Lithium trifluorotris(perfluoroethyl)phosphate  
(rechargeable lithium cell and lithium battery with improved cycle stability and good high current behavior)

L25 ANSWER 6 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
139:310053 Polymer electrolyte for rechargeable electrochemical cell.  
West, Robert; Wang, Qingzheng; Amine, Khalil (Quallion LLC, USA).  
PCT Int. Appl. WO 2003083973 A1 20031009, 22 pp. DESIGNATED STATES:  
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,

CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR.

(English). CODEN: PIXXD2. APPLICATION: WO 2003-US8779 20030320.

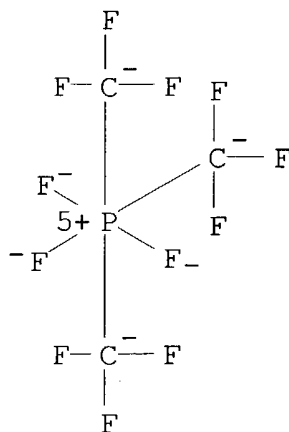
PRIORITY: US 2002-104352 20020322; US 2002-167940 20020612; WO 2003-US2127 20030122; WO 2003-US2128 20030122; US 2003-PV443892 20030130; US 2003-PV446848 20030211; US 2003-PV451065 20030226.

AB Disclosed is a cyclic siloxane polymer electrolyte for use in lithium electrochem. storage devices such as secondary batteries and capacitors. Electrolyte polymers comprising poly(siloxane-g-ethylene oxides) with one or more poly(ethylene oxide) side chains directly bonded to Si atoms are convenient to synthesize, have a long shelf life, have ionic cond. of over  $10^{-4}$  S/cm at room temp., do not evap. up to  $150^{\circ}$ , have a wide electrochem. stability window of over 4.5 V (vs. lithium), and are not flammable. Viscosity and cond. can be optimized by controlling the size of siloxane ring or the length of poly(ethylene oxide) side chain. The polymer disclosed may also be used in solid electrolyte applications by use of solidifying agents or entrapping within solid polymers. Means to synthesize both 8 and 10 membered rings are described using both boron and triethylamine as catalysts.

IT **365460-35-1**, Lithium trifluorotris(trifluoromethyl)phosphate  
**403699-22-9**, Lithium trifluorotris(perfluoroethyl)phosphate  
(polymer electrolytes contg. cyclosiloxanes for rechargeable electrochem. cell)

RN 365460-35-1 ZCA

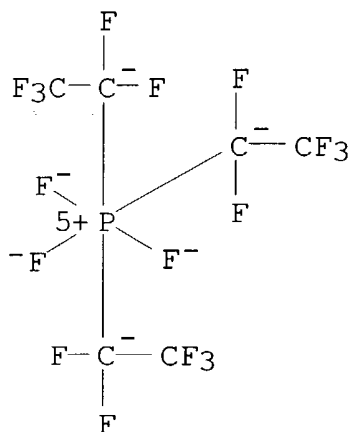
CN Phosphate(1-), trifluorotris(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 365460-35-1, Lithium trifluorotris(trifluoromethyl)phosphate  
 403699-22-9, Lithium trifluorotris(perfluoroethyl)phosphate  
 (polymer electrolytes contg. cyclosiloxanes for rechargeable  
 electrochem. cell)



L25 ANSWER 7 OF 61 ZCA COPYRIGHT 2004 ACS on STN

139:310052 Nonaqueous liquid electrolyte for lithium secondary battery. Amine, Khalil; West, Robert; Wang, Qingzheng; Oh, Bookeun; Visser, Donald R.; Tsukamoto, Hisashi (Quallion Llc, USA). PCT Int. Appl. WO 2003083972 A1 20031009, 43 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2003-US8740 20030320. PRIORITY: US 2002-104352 20020322; US 2002-167940 20020612; WO 2003-US2128 20030122; WO 2003-US2127 20030122; US 2003-PV443892 20030130; US 2003-PV446848 20030211; US 2003-PV451065 20030226.

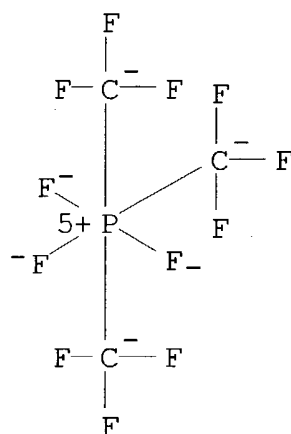
AB Disclosed is a nonaq. liq. electrolyte comprising poly(siloxane-g-3-ethylene oxide) and its synthesis. This electrolyte provides significant safety, improved electrochem. stability, improved cond., lower impedance, and lower manufg. costs.

IT 365460-35-1 403699-22-9

(nonaq. liq. electrolyte for lithium secondary battery)

RN 365460-35-1 ZCA

CN Phosphate(1-), trifluorotris(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)

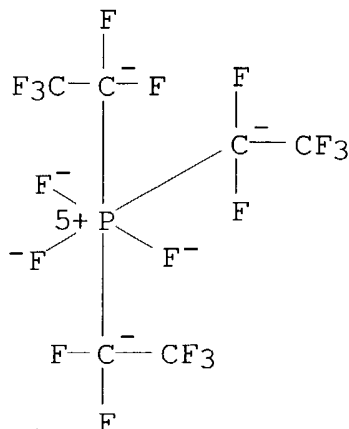


● Li<sup>+</sup>

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA

INDEX NAME)

● Li<sup>+</sup>

IT 365460-35-1 403699-22-9

(nonaq. liq. electrolyte for lithium secondary battery)

L25 ANSWER 8 OF 61 ZCA COPYRIGHT 2004 ACS on STN

139:279099 Nonaqueous and nonvolatile liquid type polymer electrolyte for battery. Oh, Bookeun; Amine, Khalil; Hyung, Yoo-Eup; Vissers, Donald R.; Tsukamoto, Hisashi (USA). U.S. Pat. Appl. Publ. US 2003180625 A1 20030925, 13 pp., Cont.-in-part of U.S. Ser. No. 104,352. (English). CODEN: USXXCO. APPLICATION: US 2002-167940 20020612. PRIORITY: US 2002-104352 20020322.

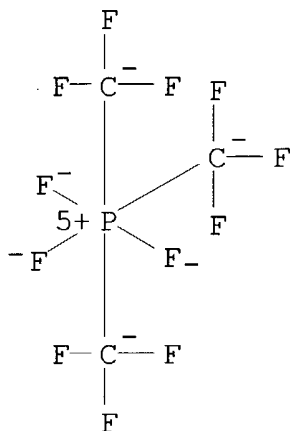
AB Disclosed is a nonaq. and nonvolatile liq. type polymeric electrolyte comprising poly(siloxane-g-ethylene oxide). This electrolyte provides significant safety and stability. The present invention solves the problems of volatility, flammability and chem. reactivity of lithium ion type electrolytes. The disclosed electrolyte exhibits excellent stability, cond. and low impedance characteristics. The electrolyte comprises a new class of structural siloxane polymers with one or more poly(ethylene oxide) side chains. The inorg. siloxanes comprising the main backbone of the copolymers are thermally very stable and resistant to decompn. by heat. Because the main chain of the disclosed class of electrolytes is an Si-O linkage, initiation of the combustion cycle is inhibited or prevented.

IT 365460-35-1 403699-22-9

(nonaq. and nonvolatile liq. type polymer electrolyte for battery)

RN 365460-35-1 ZCA

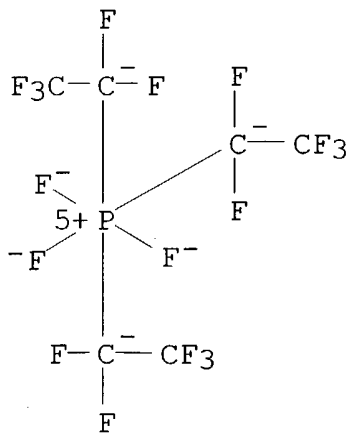
CN Phosphate(1-), trifluorotris(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 365460-35-1 403699-22-9

(nonaq. and nonvolatile liq. type polymer electrolyte for battery)

L25 ANSWER 9 OF 61 ZCA COPYRIGHT 2004 ACS on STN

139:278971 The use of accelerating rate calorimetry (ARC) for the study of the thermal reactions of Li-ion battery electrolyte solutions. Gnanaraj, J. S.; Zinigrad, E.; Asraf, L.; Gottlieb, H. E.; Sprecher, M.; Aurbach, D.; Schmidt, M. (Department of Chemistry, Bar-Ilan University, Ramat-Gan, 52900, Israel). Journal of Power Sources, 119-121, 794-798 (English) 2003. CODEN: JPSODZ. ISSN: 0378-7753. Publisher: Elsevier Science B.V..

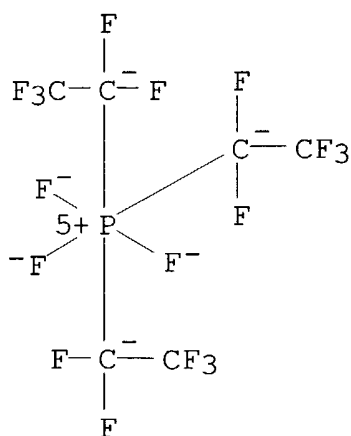
AB The thermal stability of 1M LiPF<sub>6</sub>, LiClO<sub>4</sub>, LiN(SO<sub>2</sub>CF<sub>2</sub>CF<sub>3</sub>)<sub>2</sub> (LiBETI), and LiPF<sub>3</sub>(CF<sub>2</sub>CF<sub>3</sub>)<sub>3</sub> (LiFAP) solns. in mixts. of ethylene carbonate, di-Et carbonate, and di-Me carbonate in the temp. range 40-350 °C was studied by ARC and DSC. NMR was used to analyze the reaction products at different reaction stages. The least thermally stable are LiClO<sub>4</sub> solns. LiPF<sub>3</sub>(CF<sub>2</sub>CF<sub>3</sub>)<sub>3</sub> solns. showed higher thermal stability than LiPF<sub>6</sub> solns. The highest thermal stability was found for LiN(SO<sub>2</sub>CF<sub>2</sub>CF<sub>3</sub>)<sub>2</sub> solns. Studies by DSC and pressure measurements during ARC expts. with LiPF<sub>6</sub> and LiFAP solns. detected an endothermic reaction, which occurs before a no. of exothermic reactions as the temp. increases. Fluoride ions are formed and react with the alkyl carbonate mols. both as bases and as nucleophiles.

IT 206057-04-7

(battery electrolyte; use of accelerating rate calorimetry for study of thermal reactions of Li-ion battery electrolyte solns.)

RN 206057-04-7 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 206057-04-7

(battery electrolyte; use of accelerating rate calorimetry for study of thermal reactions of Li-ion battery electrolyte solns.)

L25 ANSWER 10 OF 61 ZCA COPYRIGHT 2004 ACS on STN

139:278924 LiNi<sub>0.5</sub>Co<sub>0.5</sub>O<sub>2</sub> as a long-lived positive active material for lithium-ion batteries. Belharouak, Ilias; Tsukamoto, H.; Amine, Khalil (Chemical Technology Division, Argonne National Laboratory, Argonne, IL, 60439, USA). Journal of Power Sources, 119-121, 175-177 (English) 2003. CODEN: JPSODZ. ISSN: 0378-7753. Publisher: Elsevier Science B.V..

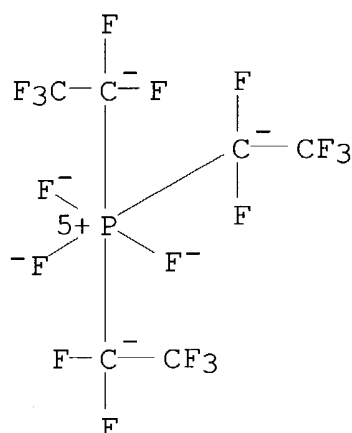
AB LiNi<sub>0.5</sub>Co<sub>0.5</sub>O<sub>2</sub> layered material could be a possible cathode material for advanced lithium-ion batteries in applications such as medical devices. The material was prep'd. by the co-pptn. method, which leads to a highly stoichiometric and homogeneous powder with a desirable particle size. It has shown reasonable cycling stability at a C/2 rate up to 100 cycles, and is expected to be much more stable at lower rates and capable of providing the needed capacity. We also showed that the use of lithium fluoroalkyl-phosphate Li[PF<sub>3</sub>(C<sub>2</sub>F<sub>5</sub>)<sub>3</sub>] salt-based electrolyte significantly improves the calendar life of the battery. Aging tests have been performed under severe conditions (storage at 50 °C and 4.1 V) clearly show a huge capacity loss for the conventional cathode LiNi<sub>0.8</sub>Co<sub>0.2</sub>O<sub>2</sub> while LiNi<sub>0.5</sub>Co<sub>0.5</sub>O<sub>2</sub> electrode exhibits a limited capacity fading. Finally, because it has less nickel content, differential scanning calorimetry (DSC) measurements confirm that LiNi<sub>0.5</sub>Co<sub>0.5</sub>O<sub>2</sub> is much safer than the LiNi<sub>0.8</sub>Co<sub>0.2</sub>O<sub>2</sub> cathode.

IT 206057-04-7

(electrolyte; LiNi<sub>0.5</sub>Co<sub>0.5</sub>O<sub>2</sub> as a long-lived pos. active material for lithium-ion batteries)

RN 206057-04-7 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 206057-04-7

(electrolyte; LiNi<sub>0.5</sub>Co<sub>0.5</sub>O<sub>2</sub> as a long-lived pos. active material for lithium-ion batteries)

L25 ANSWER 11 OF 61 ZCA COPYRIGHT 2004 ACS on STN

139:263203 A comparison among LiPF<sub>6</sub>, LiPF<sub>3</sub>(CF<sub>2</sub>CF<sub>3</sub>)<sub>3</sub> (LiFAP), and LiN(SO<sub>2</sub>CF<sub>2</sub>CF<sub>3</sub>)<sub>2</sub> (LiBETI) solutions: electrochemical and thermal studies. Gnanaraj, J. S.; Zinigrad, E.; Levi, M. D.; Aurbach, D.; Schmidt, M. (Department of Chemistry, Bar-Ilan University, Ramat-Gan, 52900, Israel). Journal of Power Sources, 119-121, 799-804 (English) 2003. CODEN: JPSODZ. ISSN: 0378-7753. Publisher: Elsevier Science B.V..

AB EC-DMC-DEC solns. comprising LiPF<sub>3</sub>(CF<sub>2</sub>CF<sub>3</sub>)<sub>3</sub> (LiFAP), LiPF<sub>6</sub> and LiN(SO<sub>2</sub>CF<sub>2</sub>CF<sub>3</sub>)<sub>2</sub> (LiBETI) were tested with graphite and LiMn<sub>2</sub>O<sub>4</sub> electrodes. Cyclic voltammetry (CV, fast and slow scan rates), chronopotentiometry, impedance spectroscopy, surface sensitive FTIR and XPS were used for this study. The new salt LiFAP is a promising candidate for use in rechargeable Li-ion batteries. The thermal behavior of these electrolyte solns. was also studied using accelerating rate calorimetry (ARC). LiFAP solns. are more stable than LiPF<sub>6</sub> solns. while LiBETI solns. have the highest thermal stability.

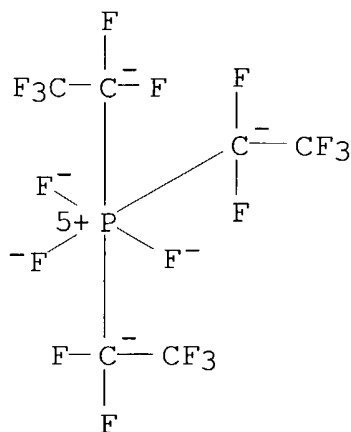
IT 206057-04-7

(LiFAP; electrochem. and thermal studies comparing LiPF<sub>6</sub>, LiPF<sub>3</sub>(CF<sub>2</sub>CF<sub>3</sub>)<sub>3</sub> (LiFAP), and LiN(SO<sub>2</sub>CF<sub>2</sub>CF<sub>3</sub>)<sub>2</sub> (LiBETI) solns. as lithium battery electrolytes)

RN 206057-04-7 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-

(9CI) (CA INDEX NAME)

● Li<sup>+</sup>

IT 206057-04-7

(LiFAP; electrochem. and thermal studies comparing LiPF<sub>6</sub>, LiPF<sub>3</sub>(CF<sub>2</sub>CF<sub>3</sub>)<sub>3</sub> (LiFAP), and LiN(SO<sub>2</sub>CF<sub>2</sub>CF<sub>3</sub>)<sub>2</sub> (LiBETI) solns. as lithium battery electrolytes)

L25 ANSWER 12 OF 61 ZCA COPYRIGHT 2004 ACS on STN

139:248054 Nonaqueous electrolytic solution and lithium secondary battery employing the same. Abe, Koji; Kuwata, Takaaki; Hattori, Takayuki; Matsumori, Yasuo (Ube Industries, Ltd., Japan). PCT Int. Appl. WO 2003077351 A1 20030918, 22 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (Japanese). CODEN: PIXXD2. APPLICATION: WO 2003-JP2991 20030313. PRIORITY: JP 2002-68034 20020313.

AB A nonaq. electrolytic soln. comprising a nonaq. solvent and an electrolyte salt dissolved therein, characterized by contg. a pentafluorophenoxy compd. represented by C<sub>6</sub>F<sub>5</sub>-OR (R = substituent, e.g., alkylcarbonyl, alkoxycarbonyl, aryloxy carbonyl, or alkanesulfonyl, provided that at least one of the hydrogen atoms of the substituent may be substituted by a halogen atom or aryl group).

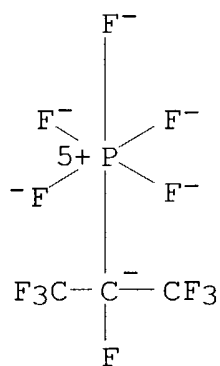
IT 205926-56-3 365454-70-2 365460-35-1,

Phosphate(1-), trifluorotris(trifluoromethyl)-, lithium  
**403699-22-9**, Phosphate(1-), trifluorotris(pentafluoroethyl)-  
 , lithium **599158-75-5**

(Nonaq. electrolytic soln. for lithium secondary battery)

RN 205926-56-3 ZCA

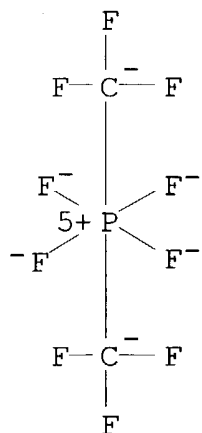
CN Phosphate(1-), pentafluoro[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-, lithium, (OC-6-21)- (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 365454-70-2 ZCA

CN Phosphate(1-), tetrafluorobis(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)

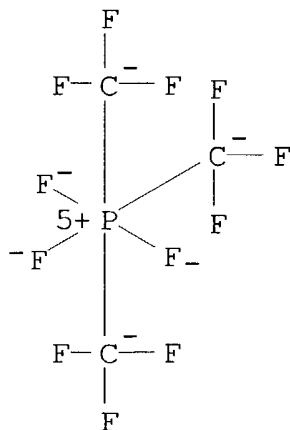


● Li<sup>+</sup>



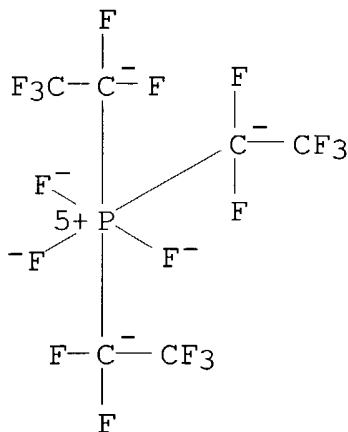
RN 365460-35-1 ZCA

CN Phosphate(1-), trifluorotris(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)

● Li<sup>+</sup>

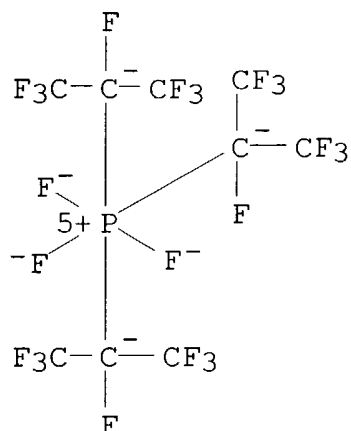
RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)

● Li<sup>+</sup>

RN 599158-75-5 ZCA

CN Phosphate(1-), trifluorotris[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 205926-56-3 365454-70-2 365460-35-1,  
Phosphate(1-), trifluorotris(trifluoromethyl)-, lithium  
403699-22-9, Phosphate(1-), trifluorotris(pentafluoroethyl)-  
, lithium 599158-75-5  
(Nonaq. electrolytic soln. for lithium secondary battery)

L25 ANSWER 13 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
138:404391 Process for fabrication of batteries with liquid organic electrolytes. Birke-Salam, Fatima; Birke, Peter; Holl, Konrad; Stelzig, Heinrich; Illic, Dejan (Varta Microbattery GmbH, Germany). Eur. Pat. Appl. EP 1317012 A2 20030604, 4 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, SK. (German). CODEN: EPXXDW. APPLICATION: EP 2002-26639 20021129. PRIORITY: DE 2001-10159230 20011203.

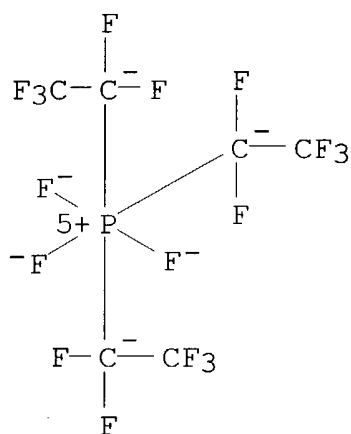
AB The title batteries comprise a separator/electrode composite, which contains  $\geq 1$  Li intercalating electrode, in whose polymer matrix polymer-insol. electrochem. active materials are finely dispersed. The electrolyte contains 2-15% C-H-O compd. (carbonate), which has a central C atom, on which an O atom is bonded by a double bond and 2 O atoms are bonded by single bonds. The O atoms bonded by single bonds are not satd. with further atoms or groups, the O atoms enclose hydrocarbon chain, whose length amts. to  $\leq 4$  C chains. The two chains differ by  $\geq 1$  or  $\geq 3$  CH<sub>2</sub> groups. With this electrolyte mixt. an electrode/separator composite is satd., cut to pieces, and

introduced into a housing. The separator/electrode composite is laminated with a current collector (or a counterelectrode) before satg. with the liq. org. electrolyte, and also satd. in the form of a roll.

IT 403699-22-9, Phosphate(1-), trifluorotris(pentafluoroethyl), lithium  
(process for fabrication of batteries with liq. org. electrolytes)

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 403699-22-9, Phosphate(1-), trifluorotris(pentafluoroethyl), lithium  
(process for fabrication of batteries with liq. org. electrolytes)

L25 ANSWER 14 OF 61 ZCA COPYRIGHT 2004 ACS on STN

138:404133 LiPF<sub>3</sub>(CF<sub>2</sub>CF<sub>3</sub>)<sub>3</sub>: A Salt for Rechargeable Lithium Ion Batteries. Gnanaraj, J. S.; Levi, M. D.; Gofer, Y.; Aurbach, D.; Schmidt, M. (Department of Chemistry, Bar-Ilan University, Ramat-Gan, 52900, Israel). Journal of the Electrochemical Society, 150(4), A445-A454 (English) 2003. CODEN: JESOAN. ISSN: 0013-4651. Publisher: Electrochemical Society.

AB LiPF<sub>3</sub>(CF<sub>2</sub>CF<sub>3</sub>)<sub>3</sub> (LiFAP) was tested as a new electrolyte for Li-ion batteries to replace LiPF<sub>6</sub>. LiPF<sub>6</sub> is unstable, it decomps. thermally to LiF and PF<sub>5</sub>, and it also is readily hydrolyzed by protic species to form HF which then contaminates electrolyte solns. This contamination may impact on the performance of anodes and

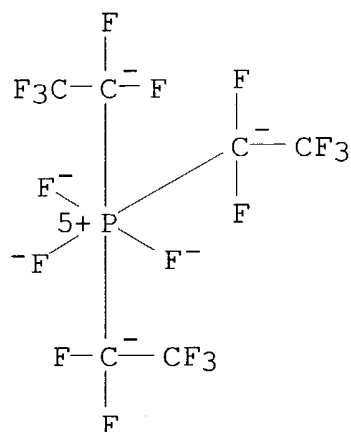
cathodes in Li-ion batteries. Solns. comprising LiFAP, LiPF<sub>6</sub>, and LiN(SO<sub>2</sub>CF<sub>2</sub>CF<sub>3</sub>)<sub>2</sub> in mixts. of ethylene, di-Me carbonates, and di-Et carbonates were tested with composite graphite and LiMn<sub>2</sub>O<sub>4</sub> electrodes. Voltammetry (fast and slow scan rates), chronopotentiometry, impedance spectroscopy, FTIR, x-ray spectroscopy and photoelectron spectroscopy were used in this study. LiFAP is superior to LiPF<sub>6</sub> as an electrolyte with respect to graphite anodes and LiMn<sub>2</sub>O<sub>4</sub> cathodes. This improvement is due to the difference in surface chem. on these electrodes when LiPF<sub>6</sub> is replaced by LiFAP. A result of replacement of LiPF<sub>6</sub> is the absence of HF contamination in LiFAP solns.

IT 206057-04-7

(lithium trifluorotris(pentafluoroethyl) phosphate electrolyte for lithium ion batteries)

RN 206057-04-7 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 206057-04-7

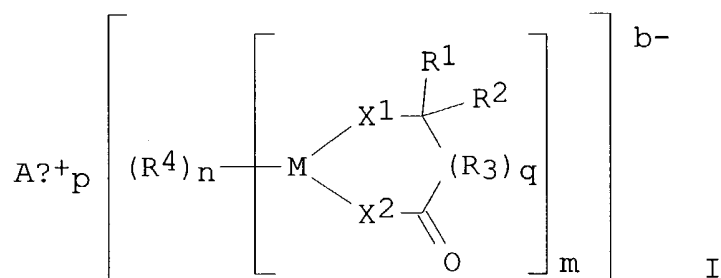
(lithium trifluorotris(pentafluoroethyl) phosphate electrolyte for lithium ion batteries)

L25 ANSWER 15 OF 61 ZCA COPYRIGHT 2004 ACS on STN

138:354100 Preparation of lithium (alkanoato)borates and (alkanoato)phosphates. Tsujioka, Shoichi; Takase, Hironari; Takahashi, Mikihiro; Isono, Yoshimi (Central Glass Co., Ltd., Japan). Eur. Pat. Appl. EP 1308449 A2 20030507, 13 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, SK.

(English). CODEN: EPXXDW. APPLICATION: EP 2002-24608 20021104.  
 PRIORITY: JP 2001-339630 20011105; JP 2002-9342 20020118.

GI



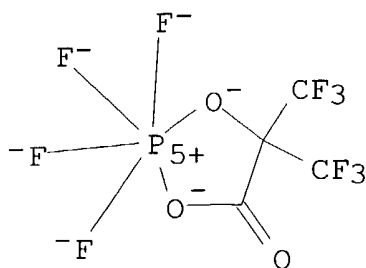
AB Ionic metal complexes [I; wherein M = an element of groups 3-15 of the periodic table; Aa<sup>+</sup> = metal ion, onium ion or proton; X1, X2, independently = O, S or NR<sub>5</sub>R<sub>6</sub>; R1, R2, independently = H, halogen, (C1-C10)alkyl, (C1-C10)halogenated alkyl; R3 = (C1-C10)alkylene, (C1-C10)halogenated alkylene, (C4-C20)aryl, (C4-C20)halogenated aryl, or together form (:O); R4 = halogen, (C1-C10)alkyl group, (C1-C10)halogenated alkyl, (C4-C20)aryl, (C4-C20)halogenated aryl, X2R<sub>7</sub>; R5, R6, independently = H, (C1-C10)alkyl; and R7 = (C1-C10)alkyl, (C1-C10)halogenated alkyl, (C4-C20)aryl, (C4-C20)halogenated aryl; a = 1, 2, 3; b = 1, 2, 3; p = b/a; m = 1, 2, 3, 4; n = 0, 1, 2, 3, 4, 5, 6, 7, 8; q = 0, 1] were prepd. For example, Li[B{OC(CF<sub>3</sub>)<sub>2</sub>CO<sub>2</sub>}<sub>2</sub>] was prepd. from HOC(CF<sub>3</sub>)<sub>2</sub>COOH and LiBF<sub>4</sub> in acetonitrile. It is possible by this process to easily and efficiently synthesize the ionic metal complex, which can be used as a supporting electrolyte for electrochem. devices, a polymn. catalyst of polyolefins and so forth, or a catalyst for org. synthesis.

IT **521065-37-2P**

(prepn. of ionic metal complexes)

RN 521065-37-2 ZCA

CN Phosphate(1-), tetrafluoro[3,3,3-trifluoro-2-(hydroxy-κO)-2-(trifluoromethyl)propanoato(2-)-κO]-, lithium, (OC-6-32)-(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 521065-37-2P

(prepn. of ionic metal complexes)

L25 ANSWER 16 OF 61 ZCA COPYRIGHT 2004 ACS on STN

138:109575 Secondary battery. Tsushima, Manabu; Morimoto, Takeshi  
(Asahi Glass Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP  
2003017118 A2 20030117, 5 pp. (Japanese). CODEN: JKXXAF.  
APPLICATION: JP 2001-198010 20010629.

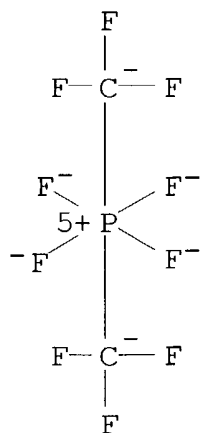
AB The battery has an active carbon based cathode, a Li-intercalating  
carbonaceous anode, and an org. electrolyte soln. contg. a compd.:  
LiPF<sub>6</sub>-n(R)n [n= integer 1-3, and R= CF<sub>3</sub> or C<sub>2</sub>F<sub>5</sub>].

IT 365454-70-2 365454-71-3 365460-35-1  
403694-32-6 403699-21-8 403699-22-9

(comps. of org. Li salts in nonaq. electrolyte solns. for  
secondary lithium batteries)

RN 365454-70-2 ZCA

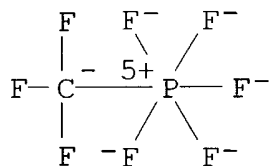
CN Phosphate(1-), tetrafluorobis(trifluoromethyl)-, lithium (9CI) (CA  
INDEX NAME)



● Li<sup>+</sup>

RN 365454-71-3 ZCA

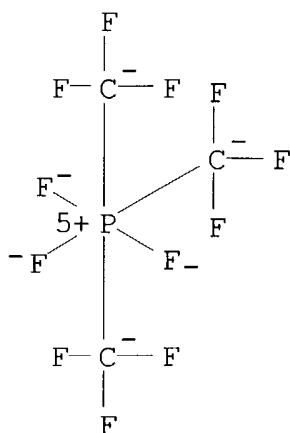
CN Phosphate(1-), pentafluoro(trifluoromethyl)-, lithium, (OC-6-21)-  
(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 365460-35-1 ZCA

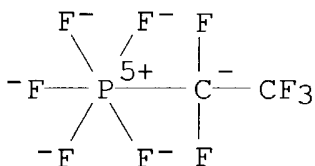
CN Phosphate(1-), trifluorotris(trifluoromethyl)-, lithium (9CI) (CA  
INDEX NAME)



● Li<sup>+</sup>

RN 403694-32-6 ZCA

CN Phosphate(1-), pentafluoro(pentafluoroethyl)-, lithium, (OC-6-21)-  
(9CI) (CA INDEX NAME)

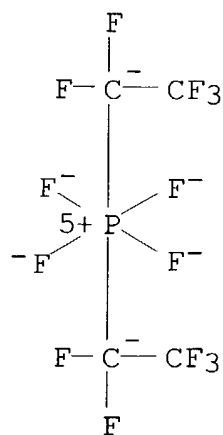


● Li<sup>+</sup>

RN 403699-21-8 ZCA

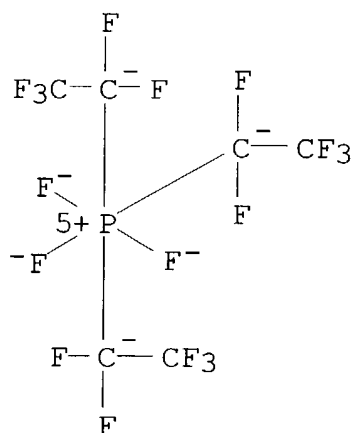
CN Phosphate(1-), tetrafluorobis(pentafluoroethyl)-, lithium (9CI) (CA  
INDEX NAME)



● Li<sup>+</sup>

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)

● Li<sup>+</sup>

IT 365454-70-2 365454-71-3 365460-35-1

403694-32-6 403699-21-8 403699-22-9

(comps. of org. Li salts in nonaq. electrolyte solns. for secondary lithium batteries)

L25 ANSWER 17 OF 61 ZCA COPYRIGHT 2004 ACS on STN

138:92290 Synthesis, properties, and uses of (perfluoroalkyl)phosphorane-based novel strong acids and acid salts as catalysts, solvents, ionic liquids, and battery electrolytes. Ignatyev, Nikolai; Schmidt, Michael; Kuehner, Andreas; Hilarius, Volker; Heider, Udo; Kucheryna, Andriy; Sartori, Peter; Willner, Helge (Merck Patent G.m.b.H., Germany). PCT Int. Appl. WO 2003002579 A1 20030109, 46 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (German). CODEN: PIXXD2. APPLICATION: WO 2002-EP6360 20020611. PRIORITY: DE 2001-10130940 20010627.

AB Novel strong (perfluoroalkyl)phosphorane-type acids and acid salts are of general formulas  $[RyPF_6-y]-.H^+$  (I) and  $[RyPF_6-y]m-.Mm^+$  (II), in which R = partially fluorinated or perfluoro-C1-8-alkyl or aryl (in which F or H can be substituted by Cl); y = 1-3; m = 1-3, and  $Mm^+$  is a mono-, di-, or trivalent cation (e.g.,  $Li^+$ ,  $Zn^{2+}$ ,  $Mg^{2+}$ ,  $Cu^{2+}$ ,  $Ag^+$ , ammonium, phosphonium, oxonium, sulfonium, arsonium, tropylium, nitryl, nitrosyl, or tris(dialkylamino)carbonium cations). I are prepd. by reaction of HF with the corresponding (perfluoroalkyl)fluorophosphoranes,  $RyPF_5-y$ , in the presence of a solvent or a proton acceptor; similarly, II are prepd. from the corresponding I by reaction with a salt, of formula  $Mm^+(A)m^-$ , in which  $Mm^+$  is as defined above and  $(A)m^-$  is a basic or neutral anion that can react with a proton (e.g., a metal, a metal hydride, a metal oxide, or a metal hydroxide). The acids and salts have use as strong acid catalysts, phase transfer catalysts, solvents, ionic liqs., or conducting salts in electrochem. devices (esp. battery electrolytes).

IT 482635-70-1P 482635-71-2P 482635-72-3P

482635-73-4P 482649-24-1P,

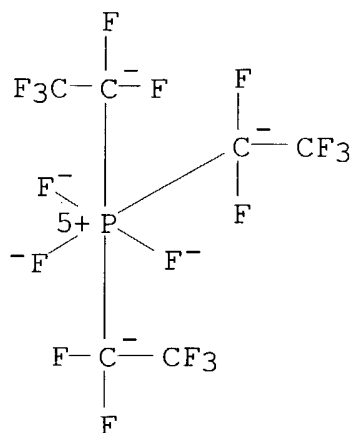
Trifluorotris(heptafluoro-1-propyl)phosphate, acid salt

482649-25-2P, Trifluorotris(nonafluoro-1-butyl)phosphate, acid salt

(synthesis, properties, and uses of (perfluoroalkyl)phosphorane-based novel strong acids and acid salts as catalysts, solvents, ionic liqs., and battery electrolytes)

RN 482635-70-1 ZCA

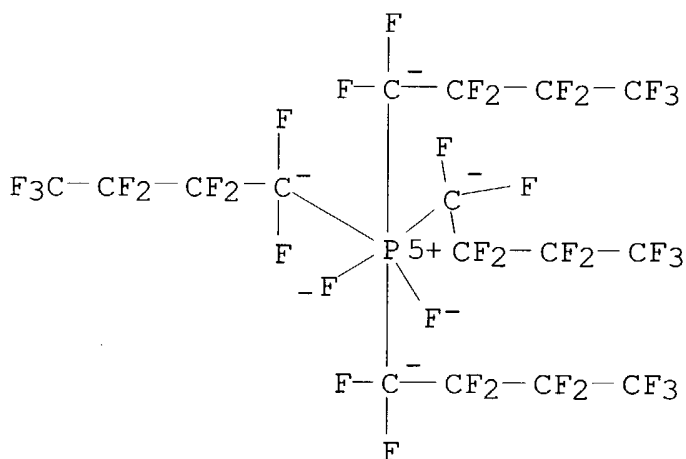
CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, hydrogen (9CI) (CA INDEX NAME)



● H<sup>+</sup>

RN 482635-71-2 ZCA

CN Phosphate(1-), difluorotetrakis(nonafluorobutyl)-, hydrogen (9CI)  
(CA INDEX NAME)

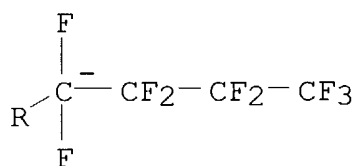
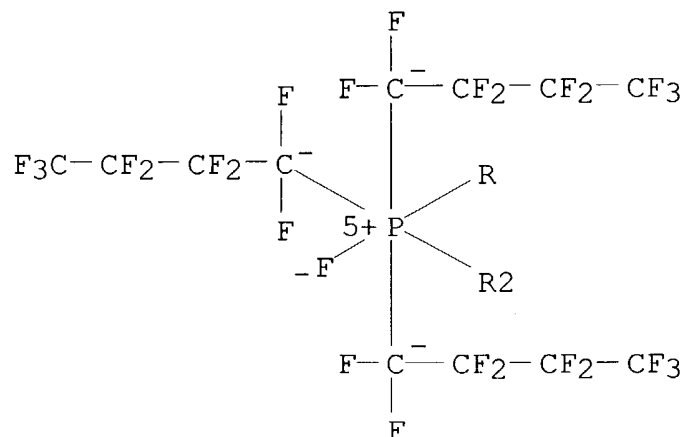


● H<sup>+</sup>

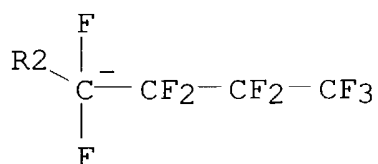
RN 482635-72-3 ZCA

CN Phosphate(1-), fluoropentakis(nonafluorobutyl)-, hydrogen,  
(OC-6-21)- (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 2-A

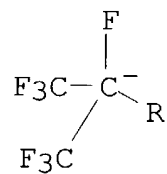
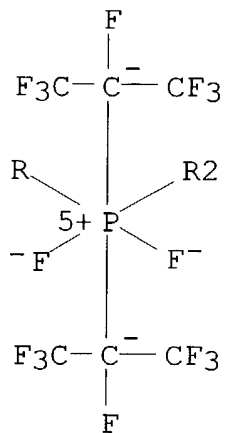


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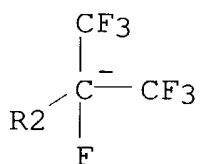
RN      482635-73-4   ZCA
CN      Phosphate(1-), difluorotetrakis[1,2,2,2-tetrafluoro-1-
        (trifluoromethyl)ethyl]-, hydrogen (9CI)   (CA INDEX NAME)

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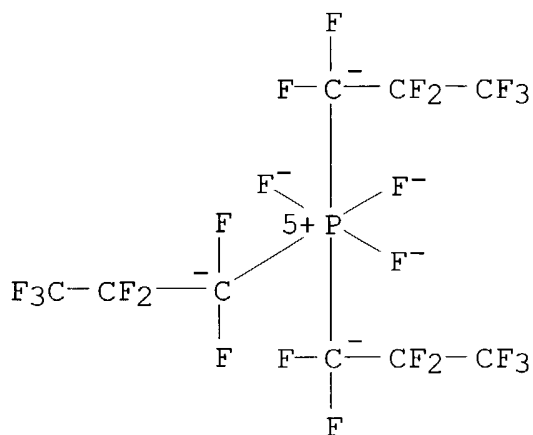
PAGE 1-A



PAGE 2-A

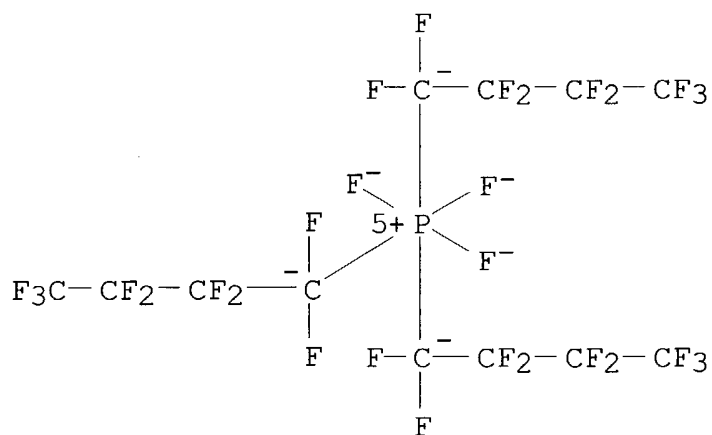


RN 482649-24-1 ZCA  
 CN Phosphate(1-), trifluorotris(heptafluoropropyl)-, hydrogen (9CI)  
 (CA INDEX NAME)



● H<sup>+</sup>

RN 482649-25-2 ZCA  
 CN Phosphate(1-), trifluorotris(nonafluorobutyl)-, hydrogen (9CI) (CA  
 INDEX NAME)



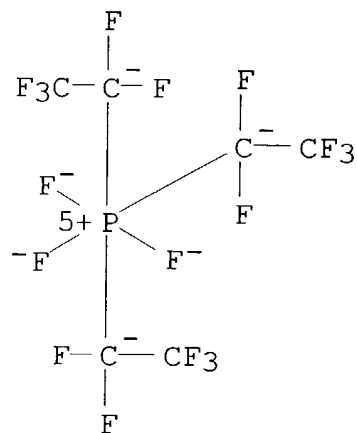
● H<sup>+</sup>

IT 403699-22-9P 463944-41-4P 482635-76-7P  
 482635-77-8P 482635-78-9P 482635-79-0P  
 482635-80-3P 482635-81-4P 482635-83-6P  
 (synthesis, properties, and uses of (perfluoroalkyl)phosphorane-  
 based novel strong acids and acid salts as catalysts, solvents,

ionic liqs., and battery electrolytes)

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 463944-41-4 ZCA

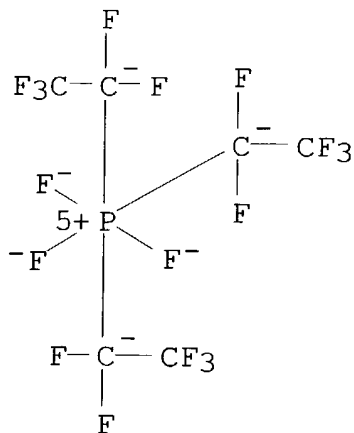
CN Ethanaminium, N,N,N-triethyl-, trifluorotris(pentafluoroethyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 429679-87-8

CMF C6 F18 P

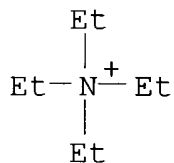
CCI CCS



CM 2

CRN 66-40-0

CMF C8 H20 N



RN 482635-76-7 ZCA

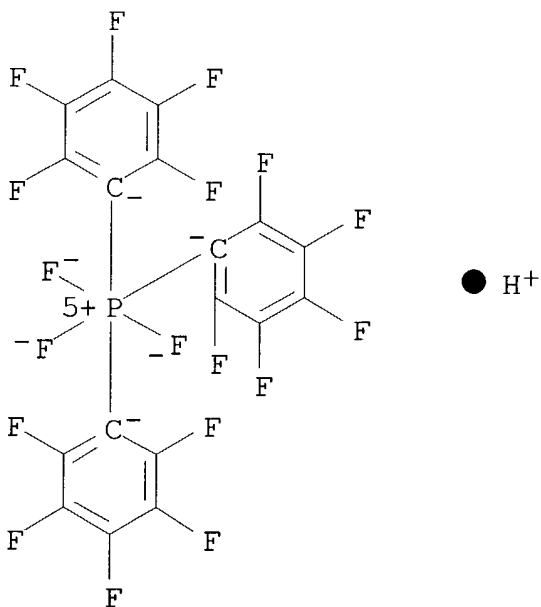
CN Phosphate(1-), trifluorotris(pentafluorophenyl)-, hydrogen, compd.  
with N,N-diethylethanamine (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 482635-75-6

CMF C18 F18 P . H

CCI CCS

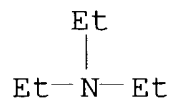


CM 2

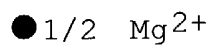
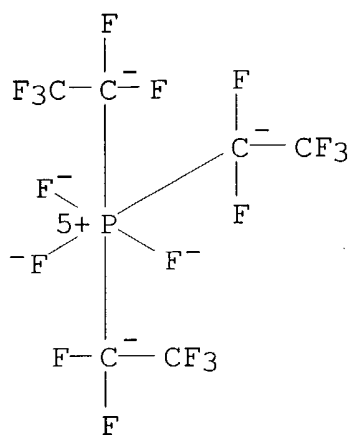
CRN 121-44-8



CMF C6 H15 N

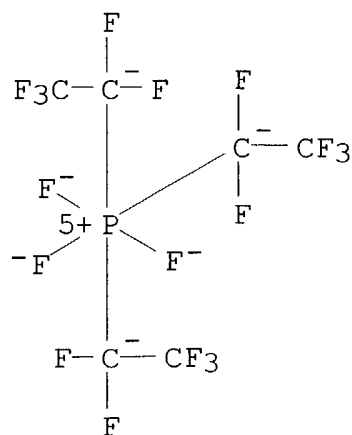


RN 482635-77-8 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, magnesium (2:1)  
(9CI) (CA INDEX NAME)

RN 482635-78-9 ZCA

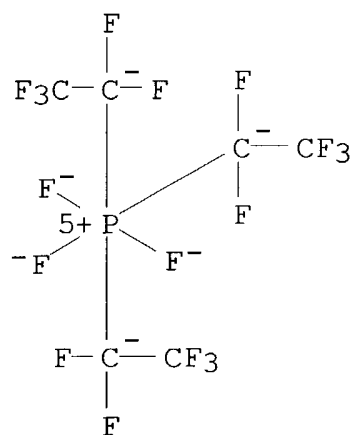
CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, zinc (2:1) (9CI)  
(CA INDEX NAME)



●1/2  $\text{Zn}^{2+}$

RN 482635-79-0 ZCA

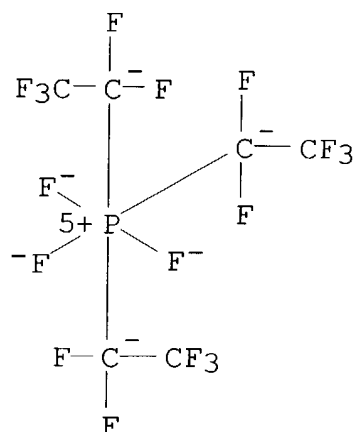
CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, copper(2+) (2:1)  
(9CI) (CA INDEX NAME)



●1/2  $\text{Cu(II)}^{2+}$

RN 482635-80-3 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, silver(1+) (9CI)  
(CA INDEX NAME)



● Ag(I) +

RN 482635-81-4 ZCA

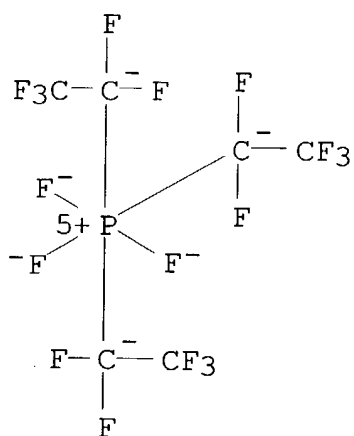
CN Phosphonium, tetrabutyl-, trifluorotris(pentafluoroethyl)phosphate(1-)  
(9CI) (CA INDEX NAME)

CM 1

CRN 429679-87-8

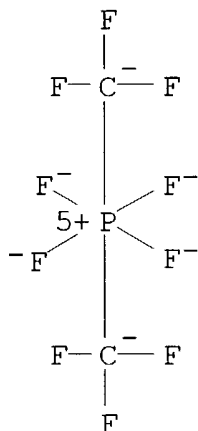
CMF C6 F18 P

CCI CCS



CM 2

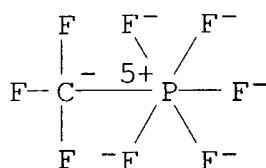
CN Phosphate(1-), tetrafluorobis(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 365454-71-3 ZCA

CN Phosphate(1-), pentafluoro(trifluoromethyl)-, lithium, (OC-6-21)- (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 365454-70-2 365454-71-3

(lithium salts having perfluoroalkyl group contg. anions for electrolytes in secondary lithium batteries)

L25 ANSWER 32 OF 61 ZCA COPYRIGHT 2004 ACS on STN

136:151308 Preparation of fluoroalkylphosphates for use in electrochemical cells. Heider, Udo; Schmidt, Michael; Kuehner, Andreas; Sartori, Peter; Ignatyev, Nikolai (Merck Patent G.m.b.H., Germany). Eur. Pat. Appl. EP 1178050 A2 20020206, 15 pp.  
 DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI,

LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (German). CODEN:  
EPXXDW. APPLICATION: EP 2001-115786 20010711. PRIORITY: DE  
2000-10038858 20000804.

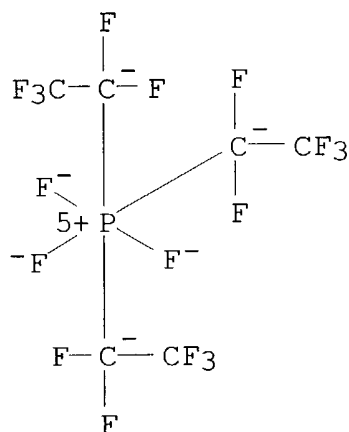
AB The prepn. of fluoroalkylphosphates via cation exchange reaction is described. Thus, reaction of  $\text{Li}[\text{PF}_3(\text{C}_2\text{F}_5)_3]$  with  $\text{Et}_4\text{NX}$  ( $\text{X} = \text{F}, \text{Cl}$ ) gave title compds.,  $\text{Et}_4\text{N}[\text{PF}_3(\text{C}_2\text{F}_5)_3]$ . The prepd. compds. are useful as supporting electrolyte in batteries, condensation, supercondensation, and electrochem. cells.

IT 206057-04-7

(cation exchange reaction with ammonium salts)

RN 206057-04-7 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-  
(9CI) (CA INDEX NAME)



●  $\text{Li}^+$

IT 394692-80-9P 394692-83-2P 394692-84-3P  
394692-91-2P 394692-92-3P 394692-93-4P  
394692-94-5P

(prepn. of fluoroalkylphosphates for use in electrochem. cells)

RN 394692-80-9 ZCA

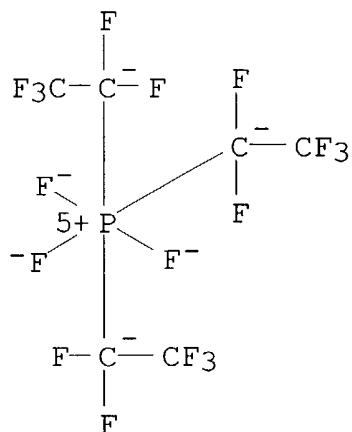
CN Ethanaminium, N,N,N-triethyl-, (OC-6-21)-  
trifluorotris(pentafluoroethyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 123199-69-9

CMF C6 F18 P

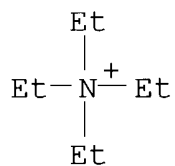
CCI CCS



CM 2

CRN 66-40-0

CMF C8 H20 N



RN 394692-83-2 ZCA

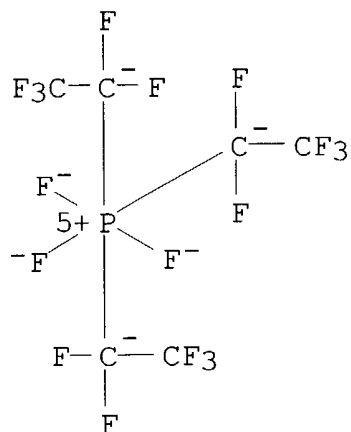
 CN Methanaminium, N,N,N-trimethyl-, (OC-6-21)-  
 trifluorotris(pentafluoroethyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 123199-69-9

CMF C6 F18 P

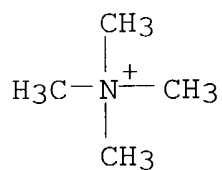
CCI CCS



CM 2

CRN 51-92-3

CMF C4 H12 N



RN 394692-84-3 ZCA

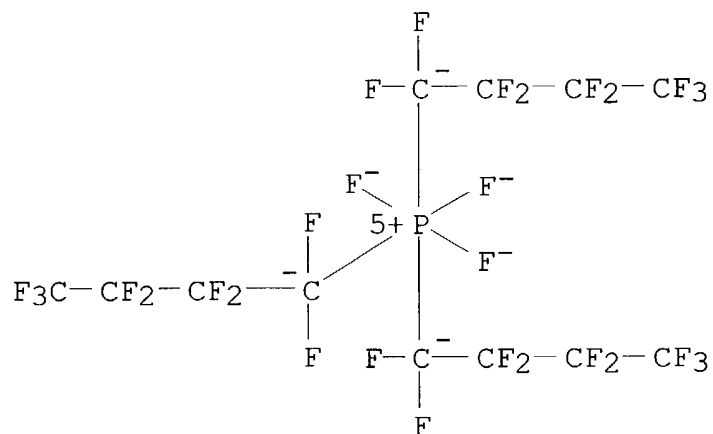
 CN Methanaminium, N,N,N-trimethyl-, (OC-6-21)-  
 trifluorotris(nonafluorobutyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

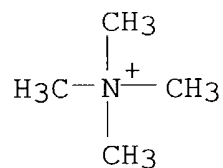
CRN 377739-46-3

CMF C12 F30 P

CCI CCS

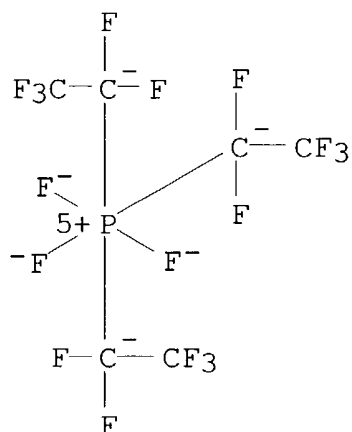


CRN 51-92-3  
CMF C4 H12 N



CRN 123199-69-9  
CMF C6 F18 P  
CCI CCS

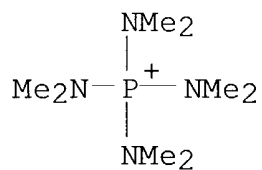




CM 2

CRN 45050-74-6

CMF C8 H24 N4 P



RN 394692-92-3 ZCA

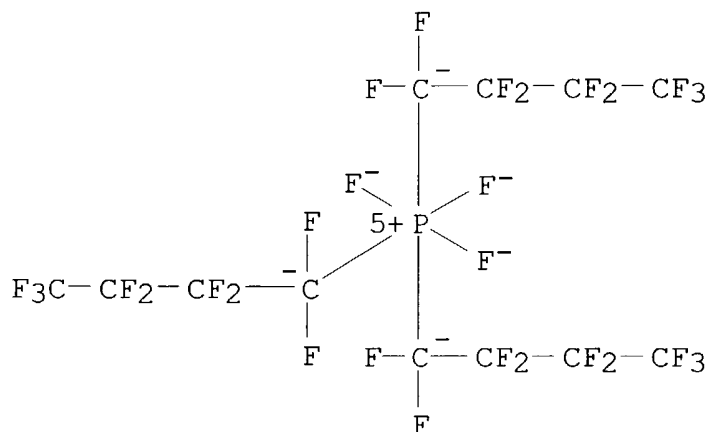
CN Phosphorus(1+), tetrakis(N-methylmethanaminato)-, (T-4)-,  
 (OC-6-21)-trifluorotris(nonafluorobutyl)phosphate(1-) (9CI) (CA  
 INDEX NAME)

CM 1

CRN 377739-46-3

CMF C12 F30 P

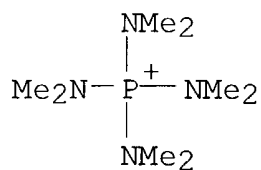
CCI CCS



CM 2

CRN 45050-74-6

CMF C8 H24 N4 P



RN 394692-93-4 ZCA

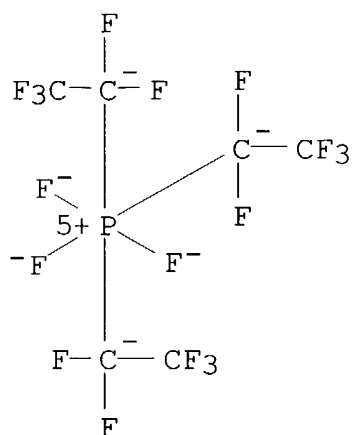
CN Methanaminium, N-[bis(dimethylamino)methylene]-N-methyl-,  
 (OC-6-21)-trifluorotris(pentafluoroethyl)phosphate(1-) (9CI) (CA  
 INDEX NAME)

CM 1

CRN 123199-69-9

CMF C6 F18 P

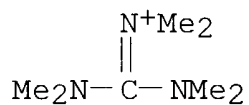
CCI CCS



CM 2

CRN 44872-05-1

CMF C7 H18 N3



RN 394692-94-5 ZCA

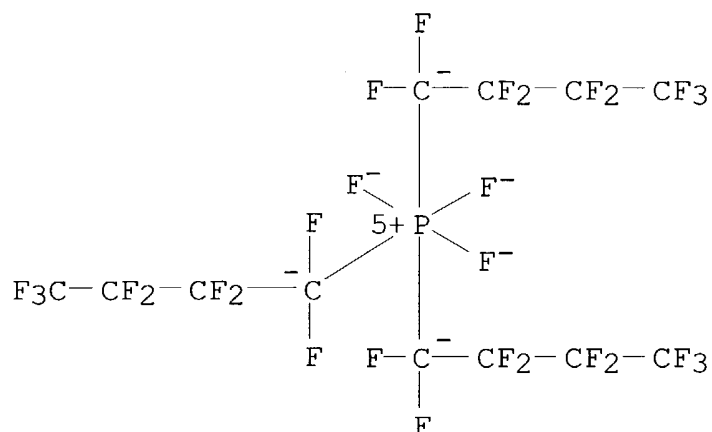
CN Methanaminium, N-[bis(dimethylamino)methylene]-N-methyl-,  
 (OC-6-21)-trifluorotris(nonafluorobutyl)phosphate(1-) (9CI) (CA  
 INDEX NAME)

CM 1

CRN 377739-46-3

CMF C12 F30 P

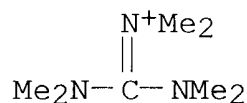
CCI CCS



CM 2

CRN 44872-05-1

CMF C7 H18 N3



IT 206057-04-7

(cation exchange reaction with ammonium salts)

IT 394692-80-9P 394692-83-2P 394692-84-3P

394692-91-2P 394692-92-3P 394692-93-4P

394692-94-5P

(prepn. of fluoroalkylphosphates for use in electrochem. cells)

L25 ANSWER 33 OF 61 ZCA COPYRIGHT 2004 ACS on STN

136:20157 Ionic liquids. Schmidt, Michael; Heider, Udo; Geissler, Winfried; Ignatyev, Nikolai; Hilarius, Volker (Merck Patent G.m.b.H., Germany). Eur. Pat. Appl. EP 1162204 A1 20011212, 19 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (German). CODEN: EPXXDW. APPLICATION: EP 2001-111953 20010521. PRIORITY: DE 2000-10027995 20000609.

AB The prepn. of title compds. is described. Thus, reaction of 1-ethyl-3-methylimidazolium chloride with Li[PF<sub>3</sub>(C<sub>2</sub>F<sub>5</sub>)<sub>3</sub>] gave title compd., 1-ethyl-3-methylimidazolium tris(pentafluoroethyl)trifluorophosphate.

IT 377739-43-0P 377739-45-2P 377739-47-4P

(prepn. as ionic liqs.)

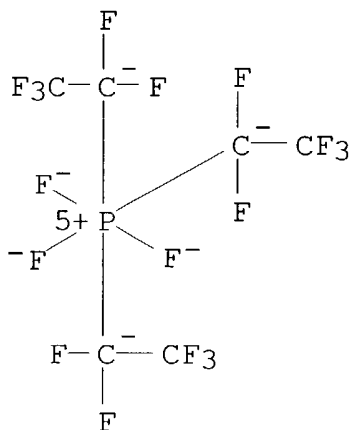
RN 377739-43-0 ZCA  
 CN 1H-Imidazolium, 1-ethyl-3-methyl-, (OC-6-21)-  
 trifluorotris(pentafluoroethyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 123199-69-9

CMF C6 F18 P

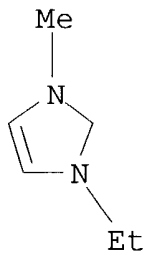
CCI CCS



CM 2

CRN 65039-03-4

CMF C6 H11 N2

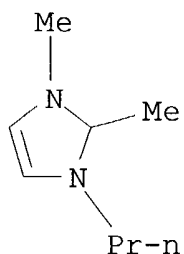


\*\*\* FRAGMENT DIAGRAM IS INCOMPLETE \*\*\*

RN 377739-45-2 ZCA  
 CN 1H-Imidazolium, 1,2-dimethyl-3-propyl-, (OC-6-21)-  
 trifluorotris(pentafluoroethyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

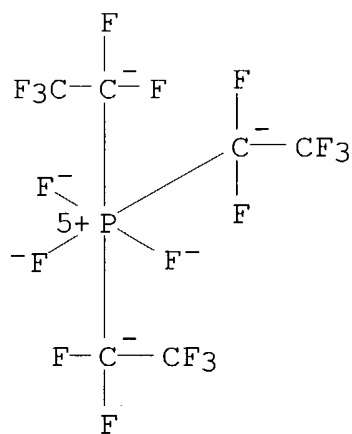
CRN 157310-70-8  
CMF C8 H15 N2



\*\*\* FRAGMENT DIAGRAM IS INCOMPLETE \*\*\*

CM 2

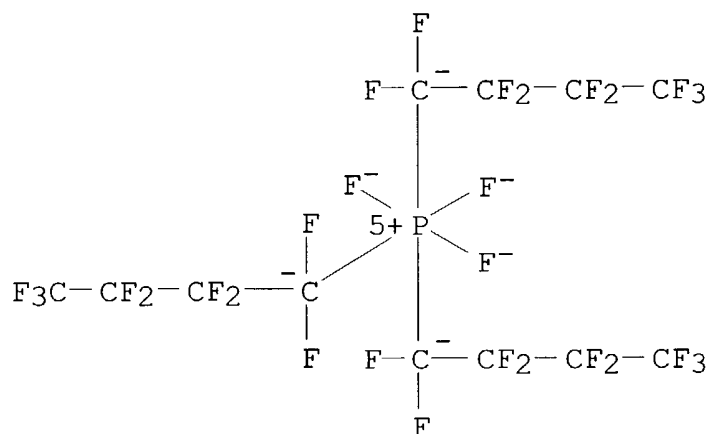
CRN 123199-69-9  
CMF C6 F18 P  
CCI CCS



RN 377739-47-4 ZCA  
CN 1H-Imidazolium, 1-ethyl-3-methyl-, (OC-6-21)-  
trifluorotris(nonafluorobutyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

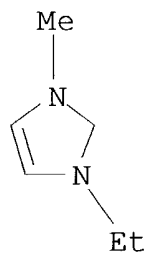
CRN 377739-46-3  
CMF C12 F30 P  
CCI CCS



CM 2

CRN 65039-03-4

CMF C6 H11 N2



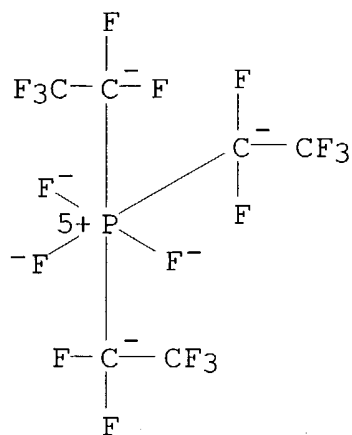
\*\*\* FRAGMENT DIAGRAM IS INCOMPLETE \*\*\*

IT 206057-04-7 377739-48-5

(reaction with imidazolium salt)

RN 206057-04-7 ZCA

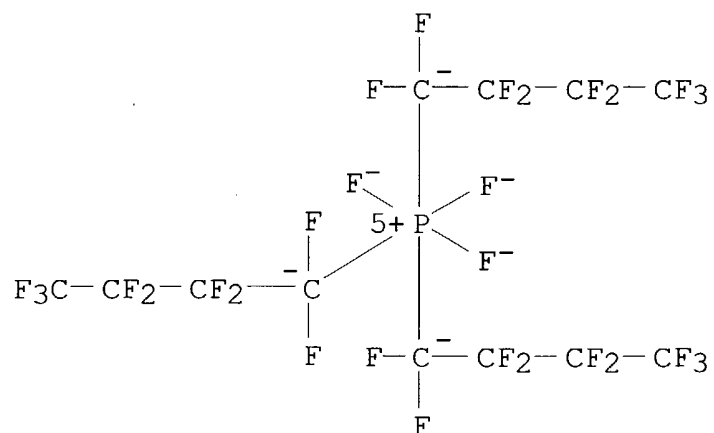
CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-  
(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 377739-48-5 ZCA

CN Phosphate(1-), trifluorotris(nonafluorobutyl)-, lithium, (OC-6-21)-  
(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 377739-43-0P 377739-45-2P 377739-47-4P  
(prepn. as ionic liqs.)

IT 206057-04-7 377739-48-5  
(reaction with imidazolium salt)



L25 ANSWER 34 OF 61 ZCA COPYRIGHT 2004 ACS on STN

135:346884 Secondary nonaqueous electrolyte batteries. Tabuchi, Toru (Japan Storage Battery Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001307774 A2 20011102, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-121720 20000421.

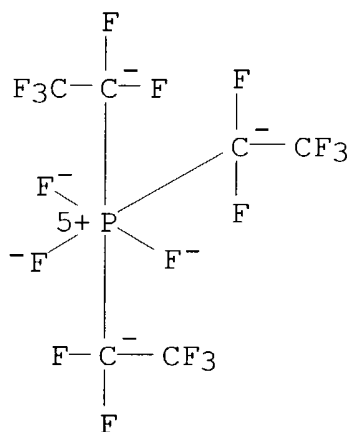
AB The batteries use cathodes contg.  $\text{Li}_2\text{CO}_3$ , and electrolyte solns. contg.  $\text{LiPF}_6$  in addn. to  $\text{LiBF}_4$ , Li amide salt, or  $\text{Li}(\text{C}_2\text{F}_5)_n\text{PF}_6-n$  ( $n = 1-6$ ).

IT 206057-04-7

(electrolyte solns. contg. lithium hexafluorophosphate and other lithium salts for secondary lithium batteries)

RN 206057-04-7 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-(9CI) (CA INDEX NAME)



●  $\text{Li}^+$

IT 206057-04-7

(electrolyte solns. contg. lithium hexafluorophosphate and other lithium salts for secondary lithium batteries)

L25 ANSWER 35 OF 61 ZCA COPYRIGHT 2004 ACS on STN

135:306219 Secondary nonaqueous electrolyte batteries. Mori, Sumio (Japan Storage Battery Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001283904 A2 20011012, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-98040 20000331.

AB The batteries use an electrolyte soln. contg. an electrolyte salt having  $(\text{C}_2\text{F}_5)_3\text{PF}_3^-$  anion. The batteries have Li intercalating cathodes and Li intercalating or Li (alloy) anodes.

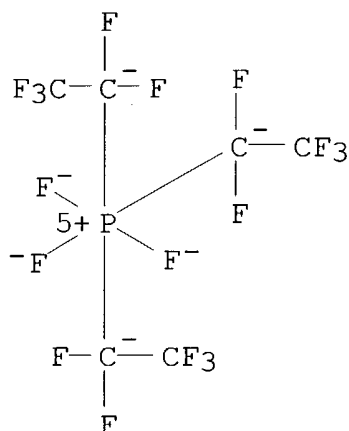
IT 206057-04-7

(electrolytes. contg. lithium hexafluorophosphate and lithium

tris-(pentafluoroethane)phosphonate for secondary lithium  
batteries)

RN 206057-04-7 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-  
(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 206057-04-7

(electrolytes. contg. lithium hexafluorophosphate and lithium  
tris-(pentafluoroethane)phosphonate for secondary lithium  
batteries)

L25 ANSWER 36 OF 61 ZCA COPYRIGHT 2004 ACS on STN

135:291389 Method of preparation of lithium salts for nonaqueous  
electrolyte batteries. Heider, Udo; Schmidt, Michael; Kuehner,  
Andreas; Petigk, Dagmar (Merck Patent G.m.b.H., Germany). Eur. Pat.  
Appl. EP 1143548 A2 20011010, 15 pp. DESIGNATED STATES: R: AT, BE,  
CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT,  
LV, FI, RO. (German). CODEN: EPXXDW. APPLICATION: EP 2001-105497  
20010315. PRIORITY: DE 2000-10016801 20000405.

AB The invention concerns the Li salt of the formula:

Li[P(OR<sub>1</sub>)<sup>a</sup>(OR<sub>2</sub>)<sup>b</sup>(OR<sub>3</sub>)<sup>c</sup>(OR<sub>4</sub>)<sup>d</sup>Fe]; where 0 < a+b+c+d ≤ 5 and  
a+b+c+d+e = 6, R<sub>1</sub> to R<sub>4</sub> are independent of each other alkyl, aryl,  
or heteroaryl residues, where ≤ 2 of R<sub>1</sub>-R<sub>4</sub> are connected  
directly to each other through a single or double bond, with the  
exception of lithium perfluoropinacolyl tetrafluorophosphonate. A  
process for prepn. of such Li salt is by conversion of a P(V) compd.  
of the formula: P(OR<sub>1</sub>)<sup>a</sup>(OR<sub>2</sub>)<sup>b</sup>(OR<sub>3</sub>)<sup>c</sup>(OR<sub>4</sub>)<sup>d</sup>Fe, where 0 < a+b+c+d  
≤ 5 and a+b+c+d+e = 5, and R<sub>1</sub>-R<sub>4</sub> have the above significances,  
with LiF in presence of an org. solvent. The Li salts possess high

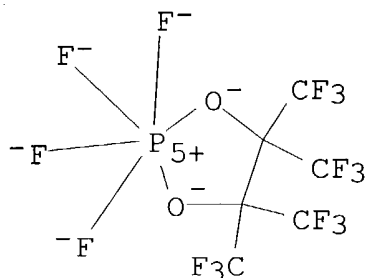
oxidn. potential and are suitable for nonaq. electrolyte batteries, esp. Li-ion batteries with high electrochem. stability.

IT **68402-98-2P 365257-17-6P**

(method of prepn. of lithium salts for nonaq. electrolyte batteries)

RN 68402-98-2 ZCA

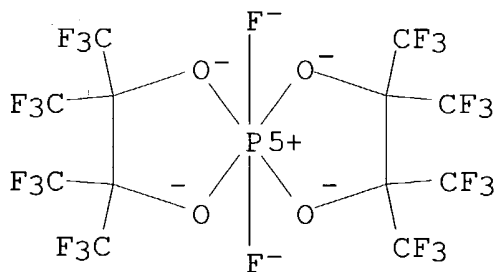
CN Phosphate(1-), tetrafluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)- $\kappa O, \kappa O'$ ]-, lithium, (OC-6-22)- (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 365257-17-6 ZCA

CN Phosphate(1-), difluorobis[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)- $\kappa O, \kappa O'$ ]-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT **68402-98-2P 365257-17-6P**

(method of prepn. of lithium salts for nonaq. electrolyte batteries)

L25 ANSWER 37 OF 61 ZCA COPYRIGHT 2004 ACS on STN

135:291217 Electronic structures and electrochemical properties of  $\text{LiPF}_6\text{-n}(\text{CF}_3)_n$ . Kita, F.; Sakata, H.; Kawakami, A.; Kamizori, H.; Sonoda, T.; Nagashima, H.; Pavlenko, N. V.; Yagupolskii, Y. L. (Battery R&D Laboratory, Hitachi Maxell Limited, Osaka, Ibaraki, 567-8567, Japan). Journal of Power Sources, 97-98, 581-583 (English) 2001. CODEN: JPSODZ. ISSN: 0378-7753. Publisher: Elsevier Science S.A..

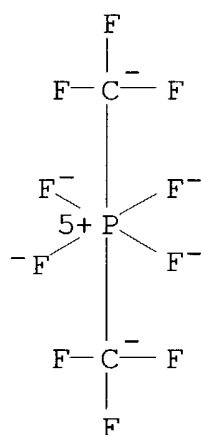
AB We evaluated (1) thermal and electrochem. stability and (2) ion-dissocn. ability of  $\text{PF}_6\text{-n}(\text{CF}_3)_n\text{-}$  anions by computational method. The thermal stability order by  $\Delta\Delta E$  (anion) is  $\text{PF}_4(\text{CF}_3)_2\text{-} > \text{PF}_5(\text{CF}_3)\text{-} > \text{PF}_3(\text{CF}_3)_3\text{-} > \text{PF}_6\text{-}$ . The ion-dissocn. ability order by  $\Delta\Delta E$  (Li salts) is  $\text{LiPF}_3(\text{CF}_3)_3 > \text{LiPF}_4(\text{CF}_3)_2 > \text{LiPF}_5(\text{CF}_3) > \text{LiPF}_6$ . The cond. of electrolyte soln. with  $\text{LiPF}_4(\text{CF}_3)_2$  (3.9 mS/cm) was a little lower than that of  $\text{LiPF}_6$  (4.4 mS/cm) in 0.1 mol/l Li salt/PC:DME electrolyte, while the oxidn. potential of  $\text{LiPF}_4(\text{CF}_3)_2$  in PC was higher than that of  $\text{LiPF}_6$ . The  $\text{LiPF}_4(\text{CF}_3)_2$ -cell showed better cycle characteristics than  $\text{LiPF}_6$ -cell.

IT 365454-70-2 365454-71-3 365460-35-1

(electronic structures and electrochem. properties of  $\text{LiPF}_6\text{-n}(\text{CF}_3)_n$ )

RN 365454-70-2 ZCA

CN Phosphate(1-), tetrafluorobis(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)

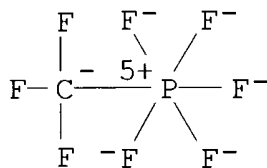


●  $\text{Li}^+$

RN 365454-71-3 ZCA

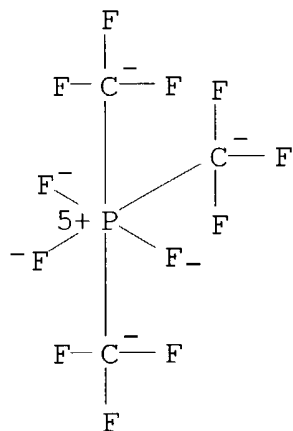
CN Phosphate(1-), pentafluoro(trifluoromethyl)-, lithium, (OC-6-21)-

(9CI) (CA INDEX NAME)

● Li<sup>+</sup>

RN 365460-35-1 ZCA

CN Phosphate(1-), trifluorotris(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)

● Li<sup>+</sup>

IT 365454-70-2 365454-71-3 365460-35-1

(electronic structures and electrochem. properties of  
LiPF<sub>6</sub>-n(CF<sub>3</sub>)<sub>n</sub>)

L25 ANSWER 38 OF 61 ZCA COPYRIGHT 2004 ACS on STN

135:291214 Lithium fluoroalkylphosphates: a new class of conducting salts for electrolytes for high energy lithium-ion batteries. Schmidt, M.; Heider, U.; Kuehner, A.; Oesten, R.; Jungnitz, M.; Ignat'ev, N.; Sartori, P. (Merck KGaA, Darmstadt, 64293, Germany). Journal of Power Sources, 97-98, 557-560 (English) 2001. CODEN: JPSODZ. ISSN: 0378-7753. Publisher: Elsevier Science S.A..

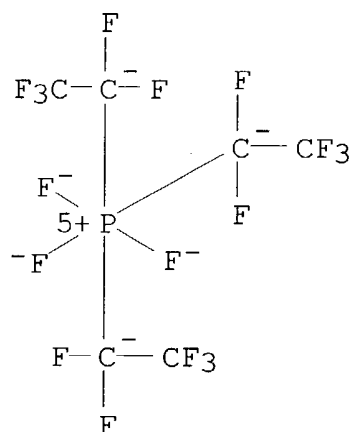
AB The effort to develop improved electrolytes that satisfy the requirements of lithium rechargeable batteries has intensified the search for new conducting salts having an improved chem. and electrochem. stability. With lithium fluoroalkylphosphates, we introduce a new class of conducting salts for electrolytes for high energy lithium-ion batteries. The results of electrochem. studies of  $\text{Li}(\text{C}_2\text{F}_5)_3\text{PF}_3$  in org. carbonates in comparison to  $\text{LiPF}_6$  including electrochem. stability and charge-discharge efficiency are reported. In addn., the influence of perfluorinated alkyl groups on stability towards hydrolysis is demonstrated.

IT 206057-04-7

(lithium fluoroalkylphosphates: a new class of conducting salts for electrolytes for high energy lithium-ion batteries)

RN 206057-04-7 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-(9CI) (CA INDEX NAME)



IT 206057-04-7

(lithium fluoroalkylphosphates: a new class of conducting salts for electrolytes for high energy lithium-ion batteries)

L25 ANSWER 39 OF 61 ZCA COPYRIGHT 2004 ACS on STN

135:203859 Lithium fluoroalkylphosphate compound and its usage as electrolyte salt. Heider, Udo; Kucheryna, Andrej; Schmidt, Michael; Ignatiev, Nikolai; Sartori, Peter (Merck Patent G.m.b.H., Germany). Jpn. Kokai Tokkyo Koho JP 2001233887 A2 20010828, 10 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-158532 20000529. PRIORITY: DE 2000-10008955 20000225.

AB Li fluoroalkylphosphate  $\text{Li}[\text{PF}_x(\text{CyF}_2\text{y}+1-\text{zHz})_6-x]$  (I;  $x = 1-5$ ;  $y =$

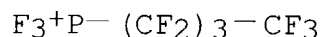
3-8;  $0 \leq z \leq 2y + 1$ ) other than  $\text{Li}[\text{PFa}(\text{CHbFc}(\text{CF}_3)_d)_e]$  ( $a = 2-5$ ;  $b = 0$  or  $1$ ;  $c = 0$  or  $1$ ;  $d = 2$ ;  $e = 1-4$ ; when  $b = 0$ ,  $c \neq 0$ ;  $a + e = 6$ ) is claimed. The compd. I is manufd. from  $\text{HmP}(\text{CnH}_{2n+1})_{3-m}$ ,  $\text{OP}(\text{CnH}_{2n+1})_3$ ,  $\text{ClmP}(\text{CnH}_{2n+1})_{3-m}$ ,  $\text{FmP}(\text{CnH}_{2n+1})_{3-m}$ ,  $\text{CloP}(\text{CnH}_{2n+1})_{5-o}$ , and/or  $\text{FoP}(\text{CnH}_{2n+1})_{5-o}$  ( $m = 0-2$ ;  $n = 3-8$ ;  $o = 0-4$ ) by electrolytic fluorination in HF, sepg. a fluorinated product by extn., phase sepn., and/or distn., reacting obtained fluorinated alkylphosphorane compd. with LiF in a nonprotonic solvent or mixed solvent free from water, and then refining a salt of I. The compd. I or its salt is used as an electrolyte salt in a primary battery, a secondary battery, a capacitor, a super capacitor, and/or an electrolytic cell. An electrolyte soln. contg. 0.01-3 mol/L I is also claimed. The compd. I is hardly hydrolyzed and a device using it provides long service life.

IT 356040-09-0P

(prepn. of; prepn. of lithium fluoroalkylphosphate compd. for electrolyte salt with long service life)

RN 356040-09-0 ZCA

CN Phosphorus(1+), trifluoro(nonafluorobutyl)-, lithium (9CI) (CA INDEX NAME)



●  $\text{Li}^+$

IT 356040-09-0P

(prepn. of; prepn. of lithium fluoroalkylphosphate compd. for electrolyte salt with long service life)

L25 ANSWER 40 OF 61 ZCA COPYRIGHT 2004 ACS on STN

135:139894 Use of amidines as electrolyte solvent of lithium batteries. Boese, Olaf; Rieland, Matthias; Seffer, Dirk; Kalbreyer, Wolfgang (Solvay Fluor und Derivate G.m.b.H., Germany). PCT Int. Appl. WO 2001057947 A1 20010809, 17 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (German). CODEN: PIXXD2. APPLICATION: WO 2001-EP886 20010127. PRIORITY: DE 2000-10004928 20000204.

AB The invention relates to amidines of perfluorinated C2-5 carboxylic

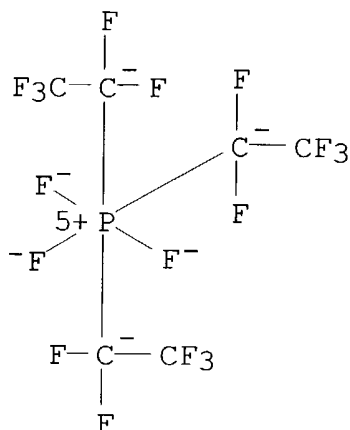
acids, which can be used as solvents or components of solvents for conducting salts in electrolytes. Some new amidines are also disclosed.

IT 206057-04-7

(use of amidines of perfluorinated C2-5 carboxylic acids as electrolyte solvent of lithium batteries)

RN 206057-04-7 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 206057-04-7

(use of amidines of perfluorinated C2-5 carboxylic acids as electrolyte solvent of lithium batteries)

L25 ANSWER 41 OF 61 ZCA COPYRIGHT 2004 ACS on STN

131:159776 Lithium secondary battery and liquid electrolyte for the battery. Arai, Juichi (Hitachi, Ltd., Japan). Eur. Pat. Appl. EP 938151 A2 19990825, 40 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 1999-102731 19990219. PRIORITY: JP 1998-38333 19980220.

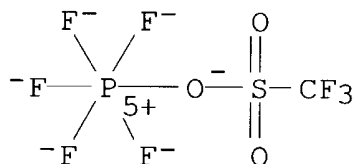
AB A lithium secondary battery comprises an anode, a cathode, a separator and a nonaq. liq. electrolyte. The nonaq. liq. electrolyte has an elec. cond. of 0.05 mS/cm or more and no such a flash point as specified by JIS-K2265 flash point test and comprises an ion nonconductive solvent and a lithium ion conductive solvent, is non-flammable and safe even at high temps.

IT 237390-40-8

(nonaq. liq. electrolyte for lithium secondary battery)



RN 237390-40-8 ZCA

CN Phosphate(1-), pentafluoro(trifluoromethanesulfonato-κO)-,  
lithium, (OC-6-21)- (9CI) (CA INDEX NAME)● Li<sup>+</sup>

IT 237390-40-8

(nonaq. liq. electrolyte for lithium secondary battery)

L25 ANSWER 42 OF 61 ZCA COPYRIGHT 2004 ACS on STN

130:52513 Investigations on systems of the type  $\text{PCl}_3/\text{MCl}_3/\text{arene}$  ( $\text{M} = \text{Al}, \text{Ga}$ ). Part 1. Reactions with monohalobenzenes. Multinuclear NMR spectroscopic characterization of aryldichlorohydrophosphonium salts. Crystal structure of (para-fluorophenyl)dichlorophosphonium tetrachloroaluminate. Frank, Walter; Gelhausen, Bjoern; Reiss, Guido J.; Salzer, Risto (Fachbereich Chemie, Universitaet Kaiserslautern, Kaiserslautern, D-67653, Germany). Zeitschrift fuer Naturforschung, B: Chemical Sciences, 53(10), 1149-1168 (German) 1998. CODEN: ZNBSEN. ISSN: 0932-0776. OTHER SOURCES: CASREACT 130:52513. Publisher: Verlag der Zeitschrift fuer Naturforschung.

AB The reactions of monohalobenzenes with  $\text{AlCl}_3$  ( $\text{GaCl}_3$ ) and  $\text{PCl}_3$  were monitored by  $^{31}\text{P}$  NMR. The primary product of the reaction of  $\text{PhF}$  with  $\text{PCl}_3$  and  $\text{AlCl}_3$  is the thermolabile  $[\text{4-FC}_6\text{H}_4\text{PHCl}_2]\text{AlCl}_4$ , which was characterized by  $^1\text{H}$ ,  $^{13}\text{C}$ ,  $^{19}\text{F}$ ,  $^{27}\text{Al}$ , and  $^{31}\text{P}$  NMR as well as by a crystal structure anal. [space group  $\text{P}2_1/\text{c}$ ,  $a$  7.0720(10),  $b$  12.659(3),  $c$  15.413(3) Å,  $\beta$  90.93(3)°,  $Z = 4$ , at  $-110^\circ$ ]. For the phosphonium ion, a very good agreement of the exptl. structural parameters and those obtained by ab initio quantum-chem. calcns. at the B3LYP 6-31++G(d,p) level of theory was obsd. Both, the exptl. detd. and the calcd. structures show a significant quinoid distortion of the 1,4-disubstituted benzene ring. From the primary product, the reaction proceeds to give exclusively  $[\text{4-FC}_6\text{H}_4\text{PPhCl}_2]\text{AlCl}_4$ . With  $\text{GaCl}_3$  and  $\text{PhF}$ , analogous tetrachlorogallates were obsd. However, some byproducts were recognized:  $[\text{4-FC}_6\text{H}_4\text{PHClF}]\text{GaCl}_4$  and  $[\text{4-FC}_6\text{H}_4\text{PHF}_2]\text{GaCl}_4$  at the beginning of the reaction, and  $[(\text{4-FC}_6\text{H}_4)_2\text{PHCl}]\text{GaCl}_4$  at a later stage of the reaction. The reaction of  $\text{PhCl}$  with  $\text{PCl}_3$  and  $\text{AlCl}_3$  yields analogous products as compared to the reaction with  $\text{PhF}$ .

However, appreciable amts. of [2-ClC<sub>6</sub>H<sub>4</sub>PHCl<sub>2</sub>]AlCl<sub>4</sub> and some [3-ClC<sub>6</sub>H<sub>4</sub>PHCl<sub>2</sub>]AlCl<sub>4</sub> are byproducts. If GaCl<sub>3</sub> was used instead of AlCl<sub>3</sub>, numerous byproducts and reaction intermediates are detectable, the major one being [4-ClC<sub>6</sub>H<sub>4</sub>PH<sub>2</sub>Cl]GaCl<sub>4</sub>. No principal differences were obsd., when AlCl<sub>3</sub> and GaCl<sub>3</sub>, resp., reacted with PhBr and PCl<sub>3</sub> giving [PhPBrCl<sub>2</sub>] and [4-BrC<sub>6</sub>H<sub>4</sub>PBrCl<sub>2</sub>] salts as well as some amts. of the 2- and 3-bromophenyl derivs. With PhI, the corresponding reactions exclusively give [PhPICl<sub>2</sub>]AlCl<sub>4</sub> and [PhPICl<sub>2</sub>]GaCl<sub>4</sub>, resp.

IT 217479-72-6P 217479-73-7P

(prepn. of phenyldichlorohydrophosphonium salts)

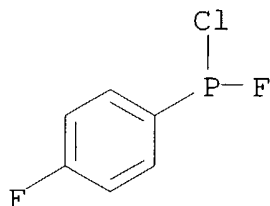
RN 217479-72-6 ZCA

CN Gallate(1-), tetrachloro-, (T-4)-, hydrogen, compd. with (4-fluorophenyl)phosphonous chloride fluoride (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 217479-71-5

CMF C6 H4 Cl F2 P

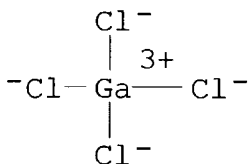


CM 2

CRN 16950-50-8

CMF Cl<sub>4</sub> Ga . H

CCI CCS

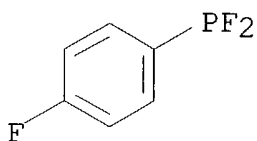


● H<sup>+</sup>

RN 217479-73-7 ZCA  
 CN Gallate(1-), tetrachloro-, (T-4)-, hydrogen, compd. with  
 (4-fluorophenyl)phosphonous difluoride (1:1) (9CI) (CA INDEX NAME)

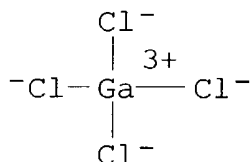
CM 1

CRN 21388-38-5  
 CMF C6 H4 F3 P



CM 2

CRN 16950-50-8  
 CMF Cl4 Ga . H  
 CCI CCS



● H<sup>+</sup>

IT 217479-72-6P 217479-73-7P  
 (prepn. of phenyldichlorohydrophosphonium salts)

L25 ANSWER 43 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
 129:330820 The Asymmetric  $\pi$ -Bases fac-{Re(dien)(PPh<sub>3</sub>)(PF<sub>3</sub>)}<sup>+</sup> and  
 fac-{Re(dien)(PPh<sub>3</sub>)(CO)}<sup>+</sup>: Evidence for Formation of an  $\eta^2$ -Furan  
 Complex. Brooks, Benjamin C.; Chin, R. Martin; Harman, W. Dean  
 (Department of Chemistry, University of Virginia, Charlottesville,  
 VA, 22901, USA). Organometallics, 17(21), 4716-4723 (English) 1998.  
 CODEN: ORGND7. ISSN: 0276-7333. OTHER SOURCES: CASREACT  
 129:330820. Publisher: American Chemical Society.  
 AB [Re(dien)(PPh<sub>3</sub>)(PF<sub>3</sub>)(L)]<sup>+</sup> (dien = diethylenetriamine) complexes,  
 where L is an unsatd. org. mol., were prepd. starting from  
 dinitrogen complexes. The range of ligands which form

$\eta^2$ -coordinate complexes with this metal center includes aldehydes, olefins, and dienes. Thiophene, benzo[b]thiophene, and MeCN bind through their heteroatoms. Although  $\{\text{Re}(\text{dien})(\text{PPh}_3)(\text{PF}_3)\}^+$  (dien = diethylenetriamine) displays chem. and spectroscopic characteristics of a potent  $\pi$ -base, it fails to form stable  $\eta^2$ -coordinated complexes with arom. mols. However, its carbonyl analog  $\{\text{Re}(\text{dien})(\text{PPh}_3)(\text{CO})\}^+$ , when combined with furan, forms  $[\text{Re}(\eta^2\text{-furan})(\text{dien})(\text{PPh}_3)(\text{CO})][\text{OTf}]$ , a rare example of a thermally stable  $\eta^2$ -heterocycle.

IT 185144-81-4

(coordinative substitution reactions with aldehydes, olefins, dienes, thiophenes, and acetonitrile)

RN 185144-81-4 ZCA

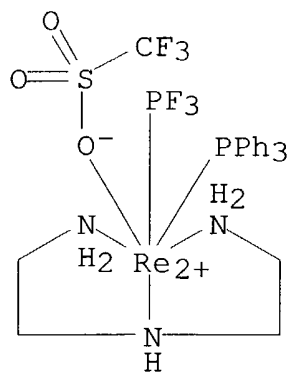
CN Rhenium(1+), [N-[2-(amino- $\kappa\text{N}$ )ethyl]-1,2-ethanediamine- $\kappa\text{N}, \kappa\text{N}'$ ](phosphorous trifluoride- $\kappa\text{P}$ )(trifluoromethanesulfonato- $\kappa\text{O}$ )(triphenylphosphine)-, (OC-6-54)-, salt with trifluoromethanesulfonic acid (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 185144-80-3

CMF C23 H28 F6 N3 O3 P2 Re S

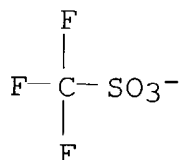
CCI CCS



CM 2

CRN 37181-39-8

CMF C F3 O3 S



IT **185144-81-4**

(coordinative substitution reactions with aldehydes, olefins, dienes, thiophenes, and acetonitrile)

L25 ANSWER 44 OF 61 ZCA COPYRIGHT 2004 ACS on STN

128:294896 Lithium fluorophosphates and their use as a conducting salts. Ignatiev, Nikolai; Sartori, Peter (Merck Patent G.m.b.H., Germany). Ger. Offen. DE 19641138 A1 19980409, 16 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1996-19641138 19961005.

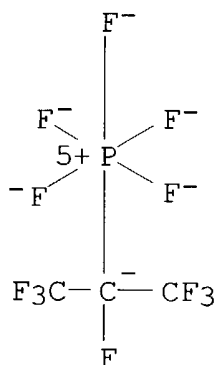
AB A method for the prepn. of lithium fluorophosphates of formula,  $\text{Li}^+[\text{PFa}(\text{CHbFc}(\text{CF}_3)_d)_e]^-$  (wherein a can be 1-5, b can be 0 or 1, c and d can be 0-3, and e can be 1-4 with the further condition that the sum of a + e = 6, the sum of b + c + d = 3 and b and c are not simultaneously 0), comprises the stepwise: 1. electrochem. fluorination of chloromono-, chlorodi-, chlorotri- or chlorotetraalkylphosphines in an inert solvent; 2. sepn. of the fluorinated products by distn. and; 3. treatment of fluorinated alkylphosphines in polar, aprotic solvent with LiF at temps. between 0° and 60°. E.g.,  $\text{Et}_3\text{P}(\text{O})$  was dissolved in HF in an electrochem. cell and underwent electrolysis in the range of 4.4 to 5.4 V to give  $(\text{CF}_3\text{CF}_2)_3\text{PF}_2$ ; subsequent treatment of  $(\text{CF}_3\text{CF}_2)_3\text{PF}_2$  with LiF in dry DME gave lithium tris(pentafluoroethyl)trifluorophosphate (I). I was examd. for its properties as an electrolyte for lithium batteries.

IT **205926-56-3P 205926-57-4P 206057-04-7P**

(electrochem.; prepn. as conducting salt in lithium batteries)

RN 205926-56-3 ZCA

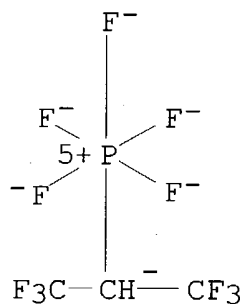
CN Phosphate(1-), pentafluoro[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-, lithium, (OC-6-21)- (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 205926-57-4 ZCA

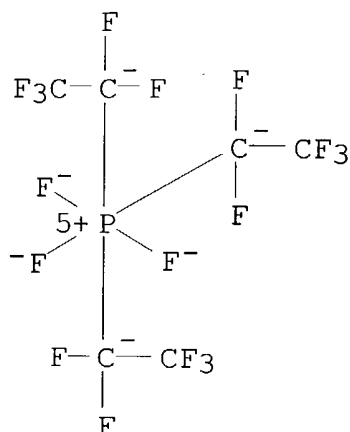
CN Phosphate(1-), pentafluoro[2,2,2-trifluoro-1-(trifluoromethyl)ethyl]-, lithium, (OC-6-21)-(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 206057-04-7 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-(9CI) (CA INDEX NAME)



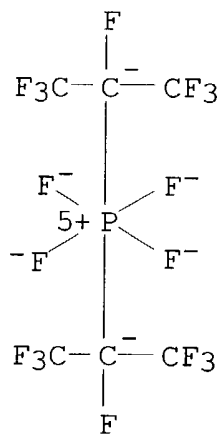
● Li<sup>+</sup>

IT 205926-54-1P 205926-55-2P

(prepn. as conducting salt in lithium batteries)

RN 205926-54-1 ZCA

CN Phosphate(1-), tetrafluorobis[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-, lithium (9CI) (CA INDEX NAME)

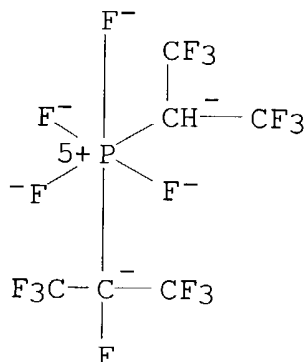


● Li<sup>+</sup>

RN 205926-55-2 ZCA

CN Phosphate(1-), tetrafluoro[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl][2,2,2-trifluoro-1-(trifluoromethyl)ethyl]-,

lithium (9CI) (CA INDEX NAME)

● Li<sup>+</sup>

- IT 205926-56-3P 205926-57-4P 206057-04-7P  
 (electrochem.; prepn. as conducting salt in lithium batteries)
- IT 205926-54-1P 205926-55-2P  
 (prepn. as conducting salt in lithium batteries)

L25 ANSWER 45 OF 61 ZCA COPYRIGHT 2004 ACS on STN

127:103492 Preparation of Rhenium(I) and Rhenium(II) Amine Dinitrogen Complexes and the Characterization of an Elongated Dihydrogen Species. Chin, R. Martin; Dubois, Raymond H.; Helberg, Lisa E.; Sabat, Michal; Bartucz, Tanya Y.; Lough, Alan J.; Morris, Robert H.; Harman, W. Dean (Departments of Chemistry, University of Virginia, Charlottesville, VA, 22901, USA). Inorganic Chemistry, 36(16), 3553-3558 (English) 1997. CODEN: INOCAJ. ISSN: 0020-1669. Publisher: American Chemical Society.

AB Re(I) dinitrogen complexes were prepd. contg. predominantly amine ligands. From IR and electrochem. data, a system was selected that was anticipated to be a suitable precursor for an elongated dihydrogen complex. Upon oxidn. by AgOTf, the dinitrogen ligand of fac-[Re(PPh<sub>3</sub>)(PF<sub>3</sub>)(dien)(N<sub>2</sub>)]<sup>+</sup> is replaced with triflate to generate fac-[Re(PPh<sub>3</sub>)(PF<sub>3</sub>)(dien)(OTf)]OTf (13), a convenient precursor to Re(II) and Re(I) amine complexes. Redn. of the Re(II) triflate 13 under 1 atm of H<sub>2</sub> gas generates fac-[Re(dien)(PPh<sub>3</sub>)(PF<sub>3</sub>)(dien)(H<sub>2</sub>)]<sup>+</sup>. Tl measurements indicate a dihydrogen species with a H-H distance of 1.38 ± 0.03 Å. The HD analog displays a JHD of 6.7 Hz, corresponding to a H-H distance of 1.31 ± 0.03 Å, a value in good agreement with that detd. from Tl data and among the largest ever measured for an elongated dihydrogen system. Crystal structures are reported for fac-[Re(PPh<sub>3</sub>)(PF<sub>3</sub>)(dien)(N<sub>2</sub>)](OTf).2Me<sub>2</sub>C



O and fac-[Re(PPh<sub>3</sub>)(PF<sub>3</sub>)(dien)(Me<sub>2</sub>CO)](OTf)<sub>2</sub> and a linear relationship of coordinated N<sub>2</sub> IR bands with E<sub>1/2</sub> values for their Re amine complexes is established.

IT **191849-40-8P**

(intermediate; prepn. of rhenium(I) and -(II) amine dinitrogen complexes and an elongated dihydrogen analog)

RN 191849-40-8 ZCA

CN Rhenium(1+), [N-[2-(amino-κN)ethyl]-1,2-ethanediamine-κN,κN'] (phosphorous trifluoride-κP) (trifluoromethanesulfonato-κO) (triphenylphosphine)-, (OC-6-54)-, salt with trifluoromethanesulfonic acid, compd. with 1,2-dimethoxyethane (1:1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 110-71-4

CMF C4 H10 O2

MeO-CH<sub>2</sub>-CH<sub>2</sub>-OMe

CM 2

CRN 185144-81-4

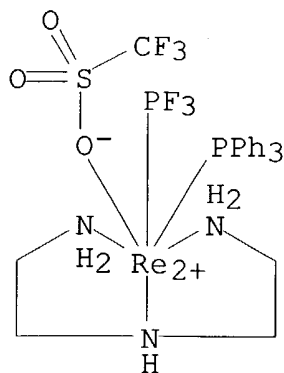
CMF C23 H28 F6 N3 O3 P2 Re S . C F3 O3 S

CM 3

CRN 185144-80-3

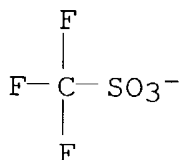
CMF C23 H28 F6 N3 O3 P2 Re S

CCI CCS



CM 4

CRN 37181-39-8  
CMF C F3 03 S

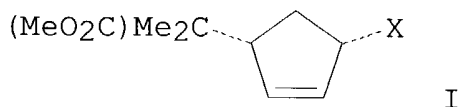


IT 191849-40-8P

(intermediate; prepn. of rhenium(I) and -(II) amine dinitrogen complexes and an elongated dihydrogen analog)

L25 ANSWER 46 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
126:75028 Sequential Electrophile/Nucleophile Additions for  $\eta^2$ -Cyclopentadiene Complexes of Osmium(II), Ruthenium(II), and Rhenium(I). Spera, Michael L.; Chin, R. Martin; Winemiller, Mark D.; Lopez, Katharine W.; Sabat, Michal; Harman, W. Dean (Department of Chemistry, University of Virginia, Charlottesville, VA, 22901, USA). Organometallics, 15(26), 5447-5449 (English) 1996. CODEN: ORGND7. ISSN: 0276-7333. OTHER SOURCES: CASREACT 126:75028. Publisher: American Chemical Society.

GI



AB D6 transition-metal complexes  $\text{ML}_5(\eta^2\text{-CpH})$ , where  $\text{ML}_5 = [\text{OsII}(\text{NH}_3)_5]^{2+}$ ,  $[\text{RuII}(\text{NH}_3)_5]^{2+}$ , and  $[\text{ReI}(\text{PPh}_3)(\text{PF}_3)(\text{dien})]^+$ , were synthesized as their triflate salts and combined with electrophiles ( $\text{HOTf}$ ,  $\text{CH}_2(\text{OMe})_2$ ) to form  $\eta^3$ -allyl complexes. Treatment of these  $\pi$ -allyl complexes with the mild C nucleophile 1-methoxy-2-methyl-1-(trimethylsiloxy)propene (MMTP) followed by decomplexation affords substituted  $\eta^2$ -cyclopentene derivs. I ( $\text{X} = \text{H}$ ,  $\text{CH}_2\text{OMe}$ ) with excellent regio- and stereocontrol. Deuteration and NOE studies for the  $\pi$ -allyl complexes along with stereochem. anal. of the org. products confirm that both electrophilic and nucleophilic addn. occurs exclusively from the exo face of the ring (opposite to metal coordination) for all three systems.

IT 185144-81-4

(for prepn. of cyclopentadiene complex)

RN 185144-81-4 ZCA

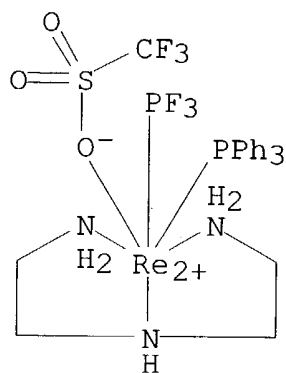
CN Rhenium(1+), [N-[2-(amino- $\kappa$ N)ethyl]-1,2-ethanediamine- $\kappa$ N, $\kappa$ N'] (phosphorous trifluoride- $\kappa$ P) (trifluoromethanesulfonato- $\kappa$ O) (triphenylphosphine)-, (OC-6-54)-, salt with trifluoromethanesulfonic acid (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 185144-80-3

CMF C23 H28 F6 N3 O3 P2 Re S

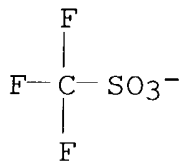
CCI CCS



CM 2

CRN 37181-39-8

CMF C F3 O3 S



IT **185144-81-4**  
(for prepn. of cyclopentadiene complex)

L25 ANSWER 47 OF 61 ZCA COPYRIGHT 2004 ACS on STN

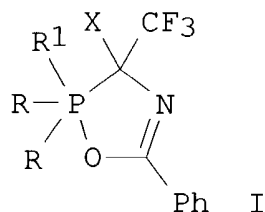
124:176270 3-Phosphorus- and sulfur-containing  $\Delta^4$ -1,4,2-

oxazaphospholines. Onys'ko, P. P.; Kolodka, T. V.; Sinitsa, A. D.  
(Inst. Org. Khim., Kiev, Ukraine). Zhurnal Obshchei Khimii, 65(6),

948-54 (Russian) 1995. CODEN: ZOKHA4. ISSN: 0044-460X. OTHER

SOURCES: CASREACT 124:176270. Publisher: Nauka.

GI



AB [4 + 1] Cycloaddn. reaction of heterodienes  $\text{CF}_3(\text{X})\text{:NCOPh}$  [ $\text{X} = \text{P}(\text{O})(\text{OEt})_2$ , 4- $\text{ClC}_6\text{H}_4\text{S}$ ] with trivalent P derivs. gave novel title compds. I (same X;  $\text{R} = \text{EtO}$ ,  $\text{PhO}$ ;  $\text{R}' = \text{F}$ ,  $\text{Cl}$ ,  $\text{EtO}$ ,  $\text{PhO}$ ). Heterodienes with donor groups [ $\text{X} = \text{Et}_2\text{NC}(\text{ME})\text{:N}$ ,  $\text{Et}_2\text{NC}(\text{CCl}_3)\text{:N}$ ] do not undergo this reaction. The X substituents decrease the rate of cycloaddn. reaction in the order  $\text{P}(\text{O})(\text{OEt})_2 > \text{Cl} > 4\text{-ClC}_6\text{H}_4\text{S}$ . During reaction of 3-chloro-3-(trifluoromethyl)-1,4,2-oxazaphospholine with  $\text{Ph}_2\text{POEt}$  or  $(\text{Et}_2\text{N})_3\text{P}$ , along with substitution of the Cl, an F atom of the  $\text{CF}_3$  group also becomes involved forming an intermediate compd. having a 6-coordinate P atom with a P-F bond.

IT **173594-29-1P 173594-30-4P**

(prepn. of oxazaphospholines by cycloaddn. reaction of heterodienes with trivalent phosphorus compds.)

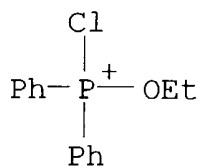
RN 173594-29-1 ZCA

CN Phosphorus(1+), chloroethoxydiphenyl-, (T-4)-, [N-(2,2-difluoroethenyl)benzamido(2-)]fluorotriphenoxyphosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 173594-28-0

CMF C14 H15 Cl O P

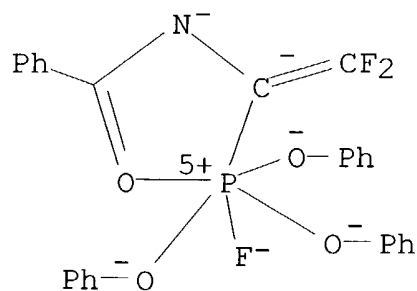


CM 2

CRN 173594-27-9

CMF C27 H20 F3 N O4 P

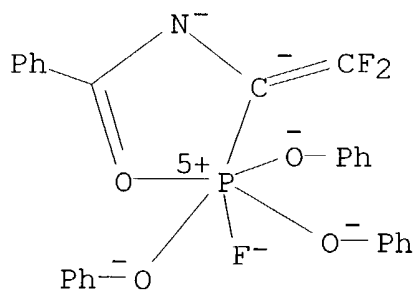
CCI CCS



RN 173594-30-4 ZCA  
 CN Phosphorus(1+), chlorotris(N-ethylethanaminato)-, (T-4)-,  
 [N-(2,2-difluoroethenyl)benzamidato(2-)]fluorotriphenoxyphosphate(1-)  
 ) (9CI) (CA INDEX NAME)

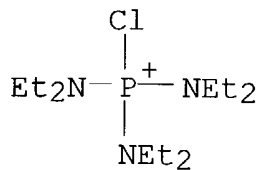
CM 1

CRN 173594-27-9  
 CMF C27 H20 F3 N O4 P  
 CCI CCS



CM 2

CRN 45187-83-5  
 CMF C12 H30 Cl N3 P



IT 173594-29-1P 173594-30-4P  
 (prepn. of oxazaphospholines by cycloaddn. reaction of

heterodienes with trivalent phosphorus compds.)

L25 ANSWER 48 OF 61 ZCA COPYRIGHT 2004 ACS on STN

118:115445 Preparation and NMR spectra of  $\text{PF}_4(\text{N-N})^+$  and  $\text{SiF}_4(\text{N-N})$ , where  $\text{N-N} = 2,2'$ -bipyridine, 4-fluoro- $2,2'$ -bipyridine, and 1,10-phenanthroline. Tuan Q. Nguyen; Qu, Fangi; Huang, Xiaoling; Janzen, Alexander F. (Dep. Chem., Univ. Manitoba, Winnipeg, MB, R3T 2N2, Can.). Canadian Journal of Chemistry, 70(7), 2089-93 (English) 1992. CODEN: CJCHAG. ISSN: 0008-4042.

AB Cationic complexes  $\text{PF}_4(\text{N-N})^+$  ( $\text{N-N} = 2,2'$ -bipyridine (bpy), 4-fluoro- $2,2'$ -bipyridine (fbpy), and 1,10-phenanthroline (phen)) were prepd. in modest yield and identified by their A2B2 and A2BC 19F NMR spectra which are similar to those of the prepd. isoelectronic  $\text{SiF}_4(\text{N-N})$  adducts. The ligands bpy, fbpy, and phen may be useful for monitoring reactions of HF and  $\text{H}_2\text{O}$ , or other fluorinated compds., with glass app. because any liberated  $\text{SiF}_4$  is then trapped as  $\text{SiF}_4(\text{N-N})$ , which can be readily detected by NMR spectroscopy.

IT **145116-95-6DP**, DMSO reaction product  
(formation and NMR of)

RN 145116-95-6 ZCA

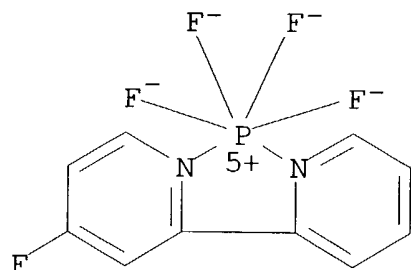
CN Phosphorus(1+), tetrafluoro(4-fluoro- $2,2'$ -bipyridine- $\text{N,N}'$ )-, (OC-6-32)-, hexafluorophosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 145116-94-5

CMF C10 H7 F5 N2 P

CCI CCS

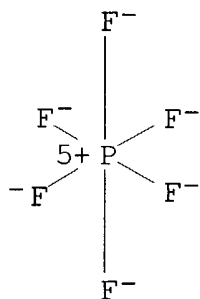


CM 2

CRN 16919-18-9

CMF F6 P

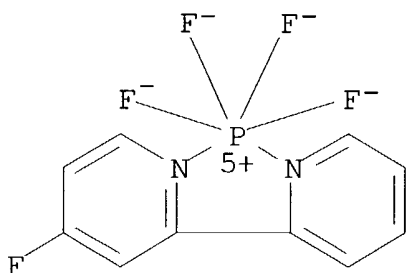
CCI CCS



IT **145116-95-6P**  
 (prepn. of)  
 RN 145116-95-6 ZCA  
 CN Phosphorus(1+), tetrafluoro(4-fluoro-2,2'-bipyridine-N,N')-,  
 (OC-6-32)-, hexafluorophosphate(1-) (9CI) (CA INDEX NAME)

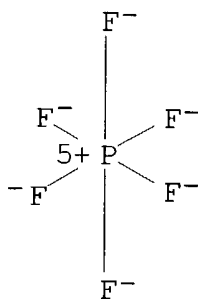
CM 1

CRN 145116-94-5  
 CMF C10 H7 F5 N2 P  
 CCI CCS



CM 2

CRN 16919-18-9  
 CMF F6 P  
 CCI CCS



IT **145116-95-6DP**, DMSO reaction product  
(formation and NMR of)

IT **145116-95-6P**  
(prepn. of)

L25 ANSWER 49 OF 61 ZCA COPYRIGHT 2004 ACS on STN

115:124174 Crystal and molecular structure of bis[(2R\*)-1-dimethyliminio-2,3,3,3-tetrafluoropropylimido]difluorophosphorus hexafluorophosphate. Chekhlov, A. N.; Lermontov, S. A.; Sukhozhenko, I. I.; Popov, A. V.; Martynov, I. V. (Inst. Fiziol. Akt. Veshchestv, Chernogolovka, USSR). Doklady Akademii Nauk SSSR, 318(3), 600-5 [Chem.] (Russian) 1991. CODEN: DANKAS. ISSN: 0002-3264.

AB The title compd. is monoclinic, space group P21/c, with a 7.642(3), b 23.104(5), c 12.228(3) Å, and  $\beta$  105.08(2)°;  $d_c$  = 1.772 for Z = 4. The at. coordinates are given. The structure was solved by direct methods and refined by least-squares to R = 0.062. The imido P atom is tetrahedrally coordinated. The bond lengths and angles are given.

IT **135840-02-7**  
(crystal structure of)

RN 135840-02-7 ZCA

CN Methanaminium, N-[1-[[[1-(dimethylamino)-2,3,3,3-tetrafluoropropylidene]amino]difluorophosphoranylidene]amino]-2,3,3,3-tetrafluoropropylidene]-N-methyl-, (R\*,R\*)-, hexafluorophosphate(1-) (9CI) (CA INDEX NAME)

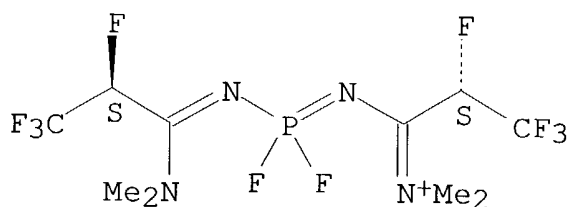
CM 1

CRN 135840-01-6

CMF C10 H14 F10 N4 P

Relative stereochemistry.  
Double bond geometry unknown.



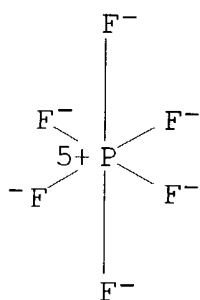


CM 2

CRN 16919-18-9

CMF F6 P

CCI CCS



IT 135840-02-7  
(crystal structure of)

L25 ANSWER 50 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
113:40832 Potassium-[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethylate], a nucleophile and reactant for oxidative fluorination in the reaction with 2-halo-4,4,5,5-tetrakis(trifluoromethyl)-1,3,2-dioxaphospholanes. Bohlen, R.; Roeschenthaler, G. V. (Inst. Anorg. Phys. Chem., Univ. Bremen, Bremen, Fed. Rep. Ger.). Zeitschrift fuer Anorganische und Allgemeine Chemie, 578, 47-57 (German) 1989. CODEN: ZAACAB. ISSN: 0044-2313. OTHER SOURCES: CASREACT 113:40832.

AB The cyclic fluorophosphite  $\text{XP}[\text{OC}(\text{CF}_3)_2\text{C}(\text{CF}_3)_2\text{O}]$  ( $\text{X} = \text{F}$ ) was oxidized by  $[\text{OCF}(\text{CF}_3)_2]^-$  to give the  $\lambda^5\sigma^6$ -phosphates  $\text{cis}\{-\{\text{F}_2\text{P}[\text{OC}(\text{CF}_3)_2\text{C}(\text{CF}_3)_2\text{O}]_2\}^-$ ,  $\text{fac/mer}$ -isomers  $\{\text{F}_3\text{P}[\text{OC}(\text{CF}_3)_2\text{C}(\text{CF}_3)_2\text{O}]\}^-$  and  $\{\text{F}_3\text{P}[\text{OCF}(\text{CF}_3)_2][\text{OC}(\text{CF}_3)_2\text{C}(\text{CF}_3)_2\text{O}]\}^-$ . In the case of the resp. chloro and bromo phosphites ( $\text{X} = \text{Cl}, \text{Br}$ ),  $\lambda^3\sigma^3\text{P}^-$  and  $\lambda^5\sigma^5\text{P}$ -compds. were obtained, too.

$\text{XC}(\text{CF}_3)_2\text{OP}[\text{OC}(\text{CF}_3)_2\text{C}(\text{CF}_3)_2\text{O}]$  ( $\text{X} = \text{Cl}, \text{Br}$ ) were probably formed by inverse halogenation from the hypothetical  $\text{FC}(\text{CF}_3)_2\text{OP}[\text{OC}(\text{CF}_3)_2\text{C}(\text{CF}_3)_2\text{O}]$  precursor for phosphorane

$\text{FC}(\text{CF}_3)_2\text{OPF}_2[\text{OC}(\text{CF}_3)_2\text{C}(\text{CF}_3)_2]$ . Possible intermediates are fluoro phosphoryl radicals and the ketyl anion  $[\text{OC}(\text{CF}_3)_2]^-$ .

Long-range F...F couplings were obsd. in  $\lambda\sigma_6$ -phosphates useful for elucidating the mol. structure.

IT 56815-82-8P 127741-55-3P 127741-56-4P

127741-59-7P 127741-60-0P 127741-61-1P

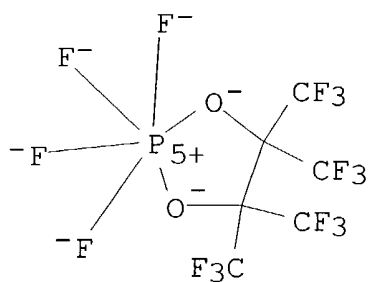
127741-62-2P 127852-55-5P 127852-56-6P

127852-57-7P 127852-58-8P

(prepn. of)

RN 56815-82-8 ZCA

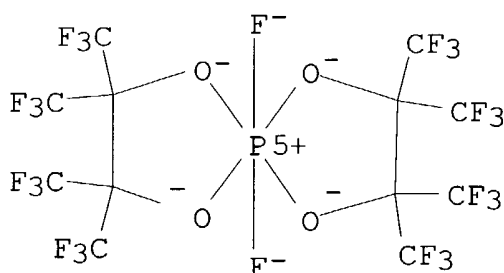
CN Phosphate(1-), tetrafluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']-, cesium, (OC-6-22)- (9CI) (CA INDEX NAME)



●  $\text{Cs}^+$

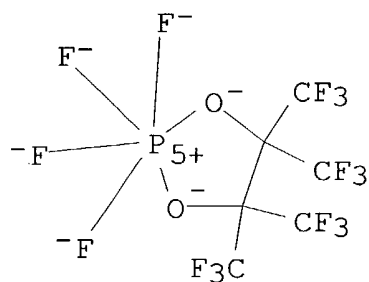
RN 127741-55-3 ZCA

CN Phosphate(1-), difluorobis[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']-, cesium, (OC-6-12)- (9CI) (CA INDEX NAME)



●  $\text{Cs}^+$

RN 127741-56-4 ZCA  
 CN Phosphate(1-), tetrafluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']-, potassium, (OC-6-22)- (9CI) (CA INDEX NAME)

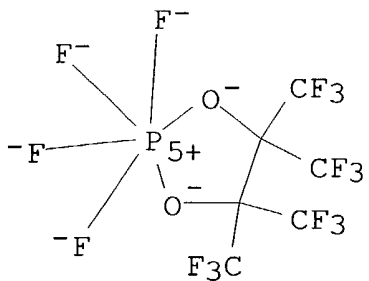


● K<sup>+</sup>

RN 127741-59-7 ZCA  
 CN Sulfiliminium, S,S-bis(dimethylamino)-N,N-dimethyl-, (OC-6-22)-tetrafluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

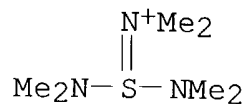
CRN 127741-58-6  
 CMF C6 F16 O2 P  
 CCI CCS



CM 2

CRN 44873-77-0

CMF C6 H18 N3 S



RN 127741-60-0 ZCA

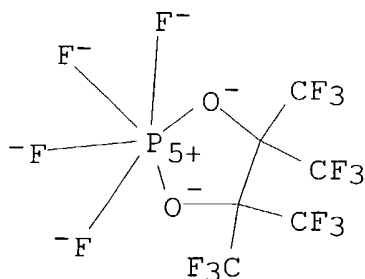
CN Phosphonium, trimethyl(1,2,3,3,3-pentafluoro-1-propenyl)-, (Z)-,  
 (OC-6-22)-tetrafluoro[1,1,1,4,4,4-hexafluoro-2,3-  
 bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']phosphate(1-) (9CI)  
 (CA INDEX NAME)

CM 1

CRN 127741-58-6

CMF C6 F16 O2 P

CCI CCS

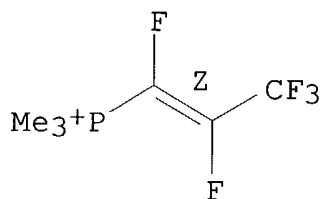


CM 2

CRN 105194-51-2

CMF C6 H9 F5 P

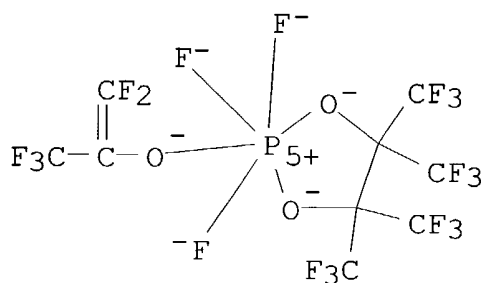
Double bond geometry as shown.



RN 127741-61-1 ZCA

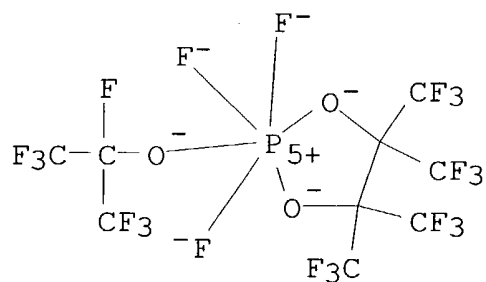
CN Phosphate(1-), trifluoro[1,1,1,4,4,4-hexafluoro-2,3-

bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O'] (1,1,3,3,3-pentafluoro-1-propen-2-olato)-, potassium, (OC-6-32)- (9CI) (CA INDEX NAME)



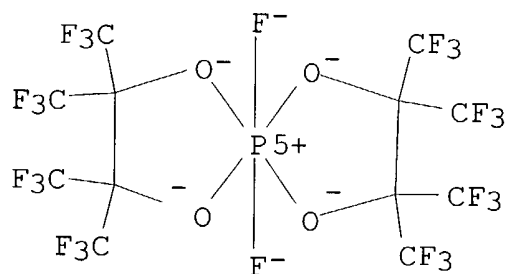
● K<sup>+</sup>

RN 127741-62-2 ZCA  
CN Phosphate(1-), trifluoro(1,1,1,2,3,3,3-heptafluoro-2-propanolato) [1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']-, potassium, (OC-6-33)- (9CI) (CA INDEX NAME)



● K<sup>+</sup>

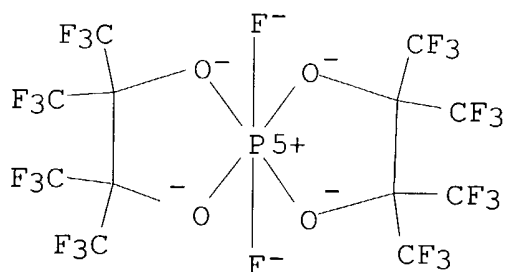
RN 127852-55-5 ZCA  
CN Phosphate(1-), difluorobis[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']-, potassium, (OC-6-22)- (9CI) (CA INDEX NAME)



● K<sup>+</sup>

RN 127852-56-6 ZCA

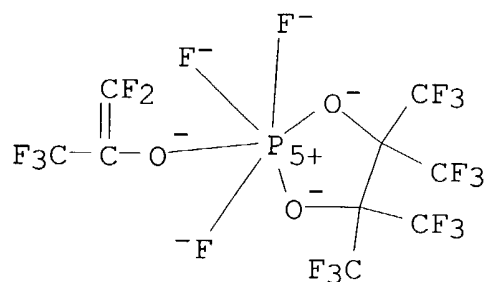
CN Phosphate(1-), difluorobis[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']-, cesium, (OC-6-22)- (9CI) (CA INDEX NAME)



● Cs<sup>+</sup>

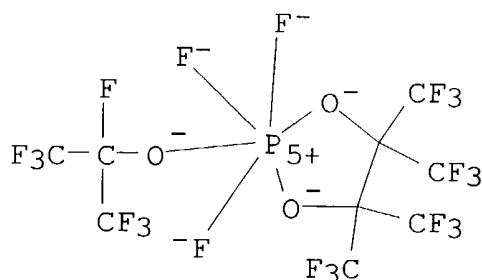
RN 127852-57-7 ZCA

CN Phosphate(1-), trifluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O'] (1,1,3,3,3-pentafluoro-1-propen-2-olato)-, potassium, (OC-6-21)- (9CI) (CA INDEX NAME)



● K<sup>+</sup>

RN 127852-58-8 ZCA  
 CN Phosphate(1-), trifluoro(1,1,1,2,3,3,3-heptafluoro-2-propanolato)[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']-, potassium, (OC-6-31)- (9CI) (CA INDEX NAME)



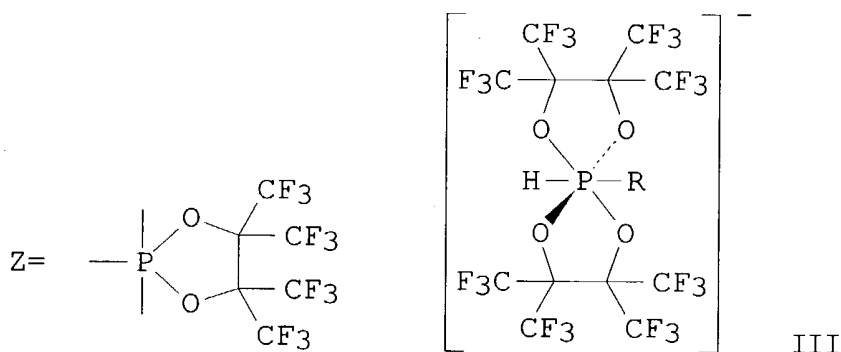
● K<sup>+</sup>

IT 56815-82-8P 127741-55-3P 127741-56-4P  
 127741-59-7P 127741-60-0P 127741-61-1P  
 127741-62-2P 127852-55-5P 127852-56-6P  
 127852-57-7P 127852-58-8P  
 (prepn. of)

L25 ANSWER 51 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
 112:35967 Cyclic  $\lambda^5\sigma^5(\sigma^6)$ -phosphorus derivatives of phosphonic and phosphinic acid as well as of the hypothetical phosphine oxide. Bohlen, Rainer; Francke, Rudolph; Roeschenthaler, Gerd Volker (Inst. Anorg. Phys. Chem., Univ. Bremen, Bremen, Fed.

Rep. Ger.). Chemiker-Zeitung, 112(11), 343-8 (German) 1988. CODEN: CMKZAT. ISSN: 0009-2894. OTHER SOURCES: CASREACT 112:35967.

GI



AB Hydrogenolysis of 2,2,2-trifluoro-4,4,5,5-tetrakis(trifluoromethyl)-1,3,2λ5σ5-dioxaphospholane (ZF3) with Me3SiH gave 95% ZHF2 (I), which on stepwise hydrogenolysis with Me3SnH gave 85% ZH2F (II) and ZH3. ZH3 slowly decompd. to give (PH)n and HOC(CF3)2C(CF3)2OH. I and II reacts with CsF to give isomeric mixts. of [ZHF3]-. Et3N defluorinated I to give ZF. Similarly Et3N also defluorinated II to give ZF, isomeric [ZHF3]- and spirophosphate III (R = H) which was also synthesized by cyclocondensation of II with LiOC(CF3)2C(CF3)2OLi. Ph2PSiMe3 also defluorinated I and II to give ZF and ZH resp. Reaction of III (R = -) with CsF gave isomeric mixt. of III (R = F). NMR of the products were discussed in detail.

IT 124374-74-9P 124374-86-3P 124374-87-4P  
124395-25-1P 124439-94-7P 124439-95-8P  
124439-96-9P 124441-03-8P

(prepn. of)

RN 124374-74-9 ZCA

CN Phosphate(1-), trifluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']hydro-, (OC-6-32)-, hydrogen, compd. with N,N-diethylethanamine (1:1) (9CI) (CA INDEX NAME)

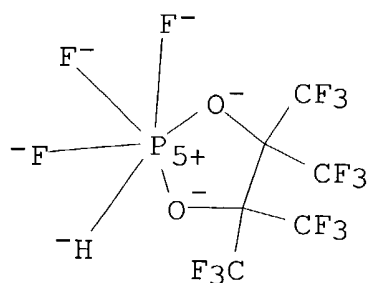
CM 1

CRN 124374-73-8

CMF C6 H F15 O2 P . H

CCI CCS

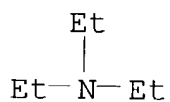




CM 2

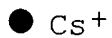
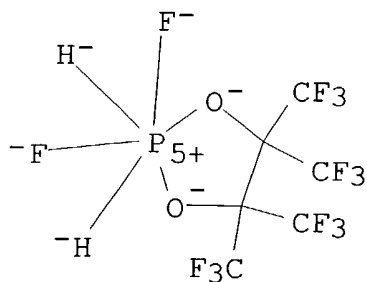
CRN 121-44-8

CMF C6 H15 N



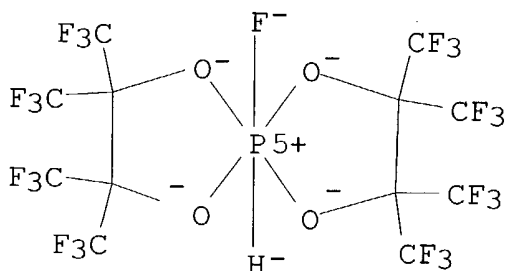
RN 124374-86-3 ZCA

CN Phosphate(1-), difluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']dihydro-, cesium, (OC-6-22)- (9CI) (CA INDEX NAME)



RN 124374-87-4 ZCA

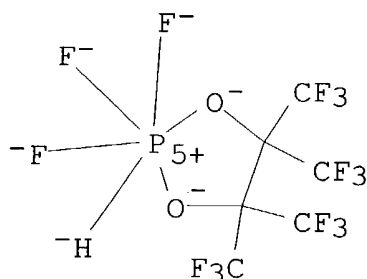
CN Phosphate(1-), fluorobis[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']hydro-, cesium, (OC-6-23)- (9CI) (CA INDEX NAME)



● Cs<sup>+</sup>

RN 124395-25-1 ZCA

CN Phosphate(1-), trifluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']hydro-, cesium, (OC-6-32)- (9CI) (CA INDEX NAME)



● Cs<sup>+</sup>

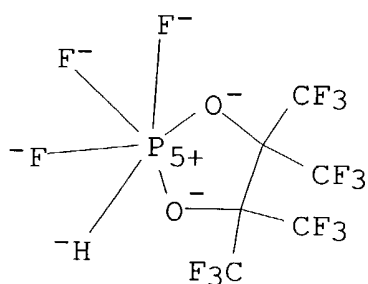
RN 124439-94-7 ZCA

CN Phosphate(1-), trifluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']hydro-, (OC-6-21)-, hydrogen, compd. with N,N-diethylethanamine (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 124439-93-6

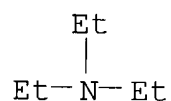
CMF C6 H F15 O2 P . H  
CCI CCS



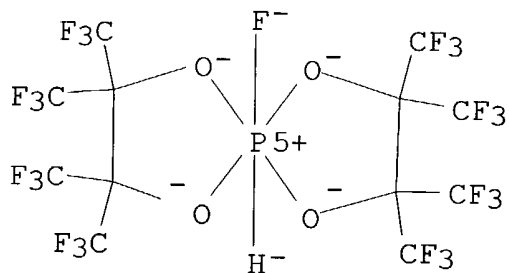
● H<sup>+</sup>

CM 2

CRN 121-44-8  
CMF C6 H15 N

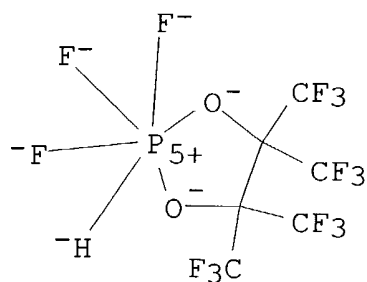


RN 124439-95-8 ZCA  
CN Phosphate(1-), fluorobis[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']hydro-, cesium, (OC-6-32)-(9CI) (CA INDEX NAME)



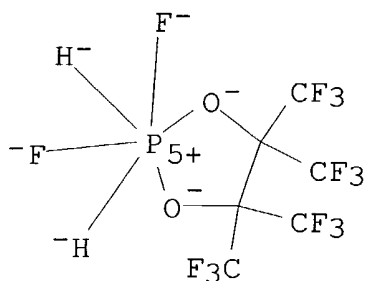
● Cs<sup>+</sup>

RN 124439-96-9 ZCA  
 CN Phosphate(1-), trifluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']hydro-, cesium, (OC-6-21)- (9CI) (CA INDEX NAME)



● Cs<sup>+</sup>

RN 124441-03-8 ZCA  
 CN Phosphate(1-), difluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']dihydro-, cesium, (OC-6-13)- (9CI) (CA INDEX NAME)



● Cs<sup>+</sup>

IT 124374-74-9P 124374-86-3P 124374-87-4P  
 124395-25-1P 124439-94-7P 124439-95-8P  
 124439-96-9P 124441-03-8P  
 (prepn. of)

L25 ANSWER 52 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
 112:35963 Preparation and spectroscopic characterization of

fluoro(trifluoromethylthio)phosphonium salts,  $\text{CF}_3\text{SPH}_2\text{F}^+ \text{MF}_6^-$  (M = As, Sb). Minkwitz, Rolf; Liedtke, Andreas (Fachbereich Chem. Anorg. Chem., Univ. Dortmund, Dortmund, D-4600/50, Fed. Rep. Ger.). Zeitschrift fuer Naturforschung, B: Chemical Sciences, 43(10), 1263-7 (German) 1988. CODEN: ZNBSEN. ISSN: 0932-0776. OTHER SOURCES: CASREACT 112:35963.

AB The prepn. of the title compds. are reported. The species have been characterized by multinuclear ( $^1\text{H}$ ,  $^{13}\text{C}$ ,  $^{19}\text{F}$ ,  $^{31}\text{P}$ ) NMR techniques. Their decompn., leading mainly to  $\text{PH}_2\text{F}_2^+ \text{MF}_6^-$ , was also studied. The Raman spectrum of  $\text{CF}_3\text{SPH}_2\text{F}^+ \text{AsF}_6^-$  is presented.

IT **124489-83-4P 124489-84-5P**

(prepn. and multinuclear NMR of)

RN 124489-83-4 ZCA

CN Arsenate(1-), hexafluoro-, hydrogen, compd. with trifluoromethyl phosphonofluoridothioite (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 124489-82-3

CMF C H F4 P S

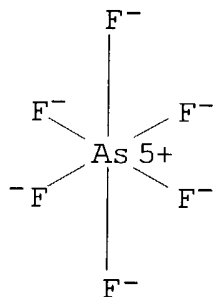
$\text{F}_3\text{C}-\text{S}-\text{PHF}$

CM 2

CRN 17068-85-8

CMF As F6 . H

CCI CCS



●  $\text{H}^+$

RN 124489-84-5 ZCA

CN Antimonate(1-), hexafluoro-, (OC-6-11)-, hydrogen, compd. with trifluoromethyl phosphonofluoridothioite (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 124489-82-3

CMF C H F4 P S

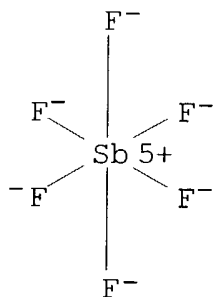
F<sub>3</sub>C-S-PHF

CM 2

CRN 16950-06-4

CMF F6 Sb . H

CCI CCS



● H<sup>+</sup>

IT 124489-83-4P 124489-84-5P  
(prepn. and multinuclear NMR of)

L25 ANSWER 53 OF 61 ZCA COPYRIGHT 2004 ACS on STN

111:174247 Reaction of tris(perfluoroalkyl)phosphine oxides and tris(perfluoroalkyl)difluorophosphoranes with fluoride ion. Pavlenko, N. V.; Yagupol'skii, L. M. (Inst. Org. Khim., Kiev, USSR). Zhurnal Obshchei Khimii, 59(3), 528-34 (Russian) 1989. CODEN: ZOKHA4. ISSN: 0044-460X. OTHER SOURCES: CASREACT 111:174247.

AB Treating (C<sub>2</sub>F<sub>5</sub>)<sub>3</sub>P(O) with 1 or 2 equiv. CsF in Et<sub>2</sub>O gave (C<sub>2</sub>F<sub>5</sub>)<sub>3</sub>PF<sub>2</sub>OCs or (C<sub>2</sub>F<sub>5</sub>)<sub>2</sub>PF<sub>2</sub>OCs, resp.; hydrolysis of the latter gave C<sub>2</sub>F<sub>5</sub>P(O)FOCs. Treating R<sub>3</sub>PF<sub>2</sub> (R = C<sub>2</sub>F<sub>5</sub>, C<sub>3</sub>F<sub>7</sub>, C<sub>4</sub>F<sub>9</sub>) with MF (M = Cs, K, Na) in Et<sub>2</sub>O gave quant. M+[R<sub>3</sub>PF<sub>3</sub>]-. Diazotization of

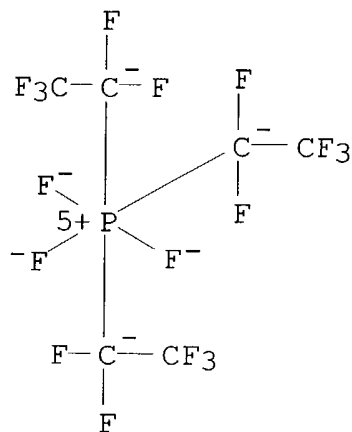
4-XC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub> (X = Cl, Me, NO<sub>2</sub>) and subsequent reaction with K+[R<sub>3</sub>PF<sub>3</sub>]-  
(R = C<sub>2</sub>F<sub>5</sub>, C<sub>3</sub>F<sub>7</sub>) gave 77-88% [4-XC<sub>6</sub>H<sub>4</sub>N<sub>2</sub>]+[R<sub>3</sub>PF<sub>3</sub>]-.

IT **123215-04-3P**

(prepn. and reaction of, with diazonium salt)

RN 123215-04-3 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, potassium,  
(OC-6-21)- (9CI) (CA INDEX NAME)



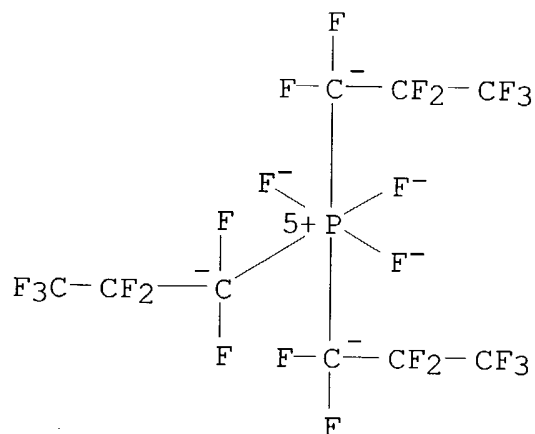
● K<sup>+</sup>

IT **123199-67-7P**

(prepn. and reaction of, with diazonium salts)

RN 123199-67-7 ZCA

CN Phosphate(1-), trifluorotris(heptafluoropropyl)-, potassium,  
(OC-6-21)- (9CI) (CA INDEX NAME)



● K<sup>+</sup>

IT 123199-70-2P 123199-72-4P 123199-73-5P  
123199-74-6P

(prepn. and thermal decompn. of)

RN 123199-70-2 ZCA

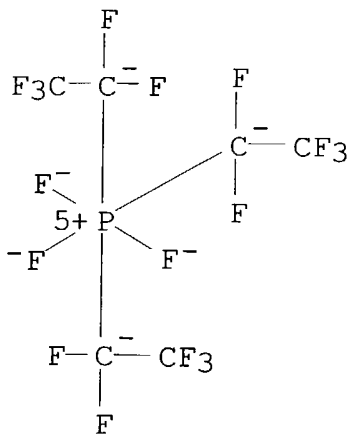
CN Benzenediazonium, 4-chloro-, (OC-6-21)-trifluorotris(pentafluoroethyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 123199-69-9

CMF C6 F18 P

CCI CCS

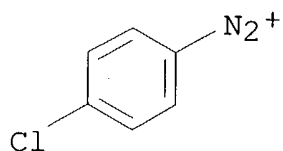




CM 2

CRN 17333-85-6

CMF C6 H4 Cl N2



RN 123199-72-4 ZCA

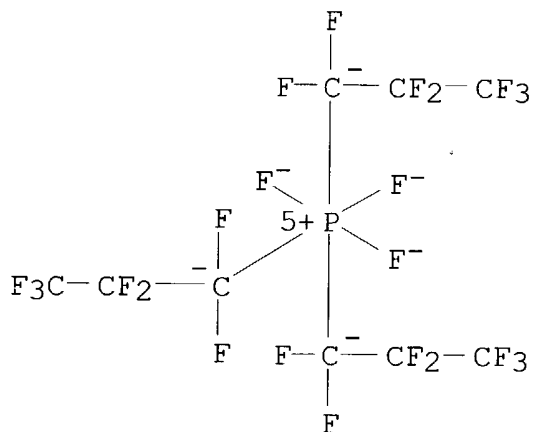
CN Benzenediazonium, 4-chloro-, (OC-6-21)-trifluorotris(heptafluoropropyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 123199-71-3

CMF C9 F24 P

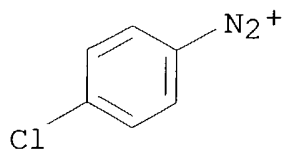
CCI CCS



CM 2

CRN 17333-85-6

CMF C6 H4 Cl N2



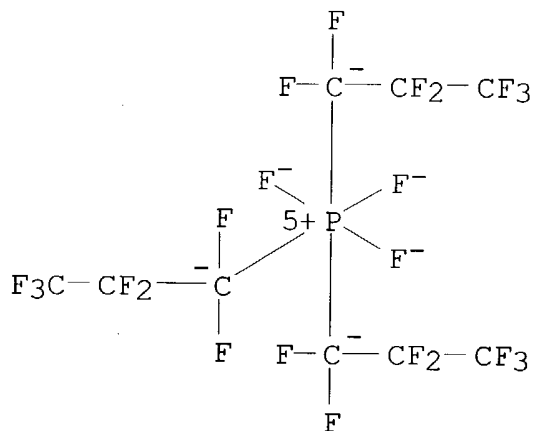
RN 123199-73-5 ZCA  
 CN Benzenediazonium, 4-methyl-, (OC-6-21)-trifluorotris(heptafluoropropyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 123199-71-3

CMF C9 F24 P

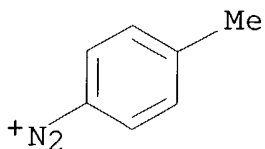
CCI CCS



CM 2

CRN 57573-52-1

CMF C7 H7 N2



RN 123199-74-6 ZCA  
 CN Benzenediazonium, 4-nitro-, (OC-6-21)-trifluorotris(heptafluoropropyl)phosphate(1-) (9CI) (CA INDEX NAME)

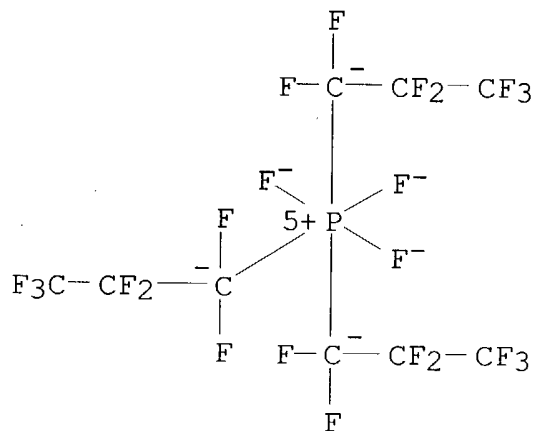
1)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 123199-71-3

CMF C9 F24 P

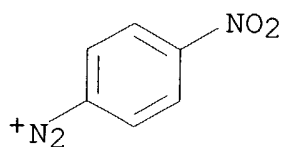
CCI CCS



CM 2

CRN 14368-49-1

CMF C6 H4 N3 O2



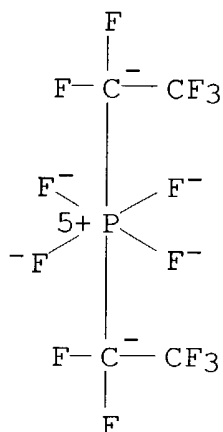
IT 123199-63-3P 123199-64-4P 123199-65-5P

123199-66-6P 123199-68-8P

(prepn. of)

RN 123199-63-3 ZCA

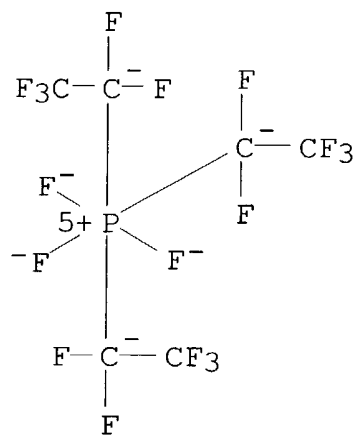
CN Phosphate(1-), tetrafluorobis(pentafluoroethyl)-, cesium, (OC-6-11)-  
(9CI) (CA INDEX NAME)



● Cs<sup>+</sup>

RN 123199-64-4 ZCA

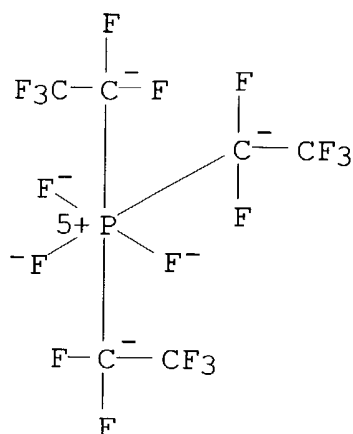
CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, cesium, (OC-6-21)-  
(9CI) (CA INDEX NAME)



● Cs<sup>+</sup>

RN 123199-65-5 ZCA

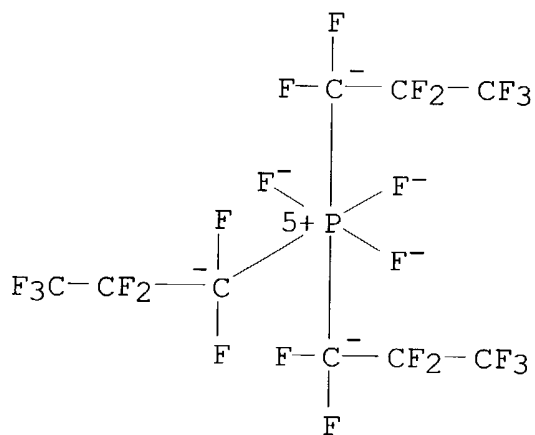
CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, sodium, (OC-6-21)-  
(9CI) (CA INDEX NAME)



● Na<sup>+</sup>

RN 123199-66-6 ZCA

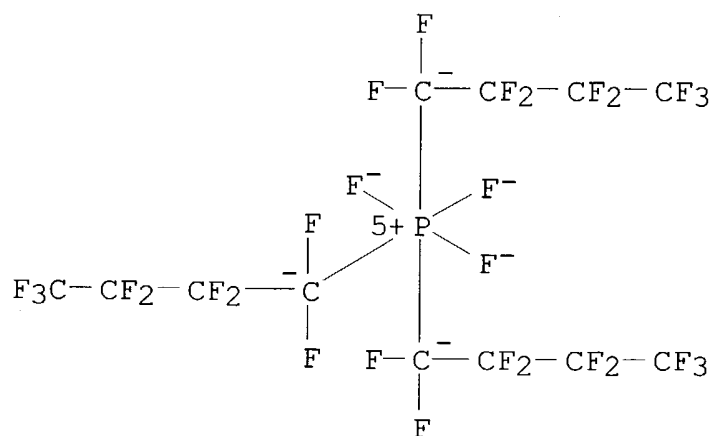
CN Phosphate(1-), trifluorotris(heptafluoropropyl)-, cesium, (OC-6-21)-  
(9CI) (CA INDEX NAME)



● Cs<sup>+</sup>

RN 123199-68-8 ZCA

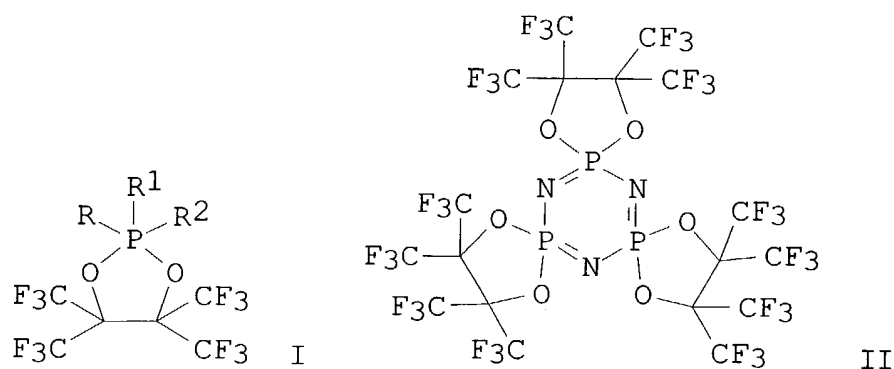
CN Phosphate(1-), trifluorotris(nonafluorobutyl)-, potassium,  
(OC-6-21)- (9CI) (CA INDEX NAME)



- IT 123215-04-3P  
 (prepn. and reaction of, with diazonium salt)
- IT 123199-67-7P  
 (prepn. and reaction of, with diazonium salts)
- IT 123199-70-2P 123199-72-4P 123199-73-5P  
 123199-74-6P  
 (prepn. and thermal decompn. of)
- IT 123199-63-3P 123199-64-4P 123199-65-5P  
 123199-66-6P 123199-68-8P  
 (prepn. of)

L25 ANSWER 54 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
 96:218017 Ammonolysis of 2,2,2-trifluoro-4,4,5,5-tetrakis(trifluoromethyl)-1,3,2λ5-dioxaphospholane.  
 Roeschenthaler, G. V.; Storzer, W.; Schmutzler, R. (Fachber. 3, Univ. Bremen, Bremen, D-2800/33, Fed. Rep. Ger.). Journal of Fluorine Chemistry, 19(3-6), 579-88 (German) 1982. CODEN: JFLCAR. ISSN: 0022-1139.

GI



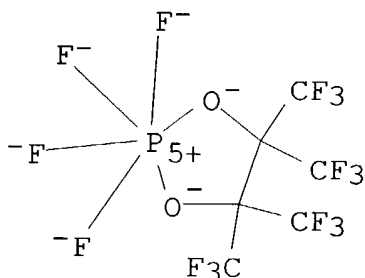
AB Amines I ( $R = \text{NH}_2$ ,  $R_1 = R_2 = \text{F}$ ;  $R = R_1 = \text{NH}_2$ ,  $R_2 = \text{F}$ ) were prep'd. in 72, 70% yields resp. by treating I ( $R-R_2 = \text{F}$ ) with 2 or 4 equiv. of  $\text{NH}_3$ . Treating I ( $R = R_1 = \text{NH}_2$ ,  $R_2 = \text{F}$ ) with  $\text{LiNH}_2$  gave 98% I ( $R-R_2 = \text{NH}_2$ ) which liberates  $\text{NH}_3$  to give 100% spiro comp'd. II.

IT **81915-00-6P**

(prepn. of)

RN 81915-00-6 ZCA

CN Phosphate(1-), tetrafluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']-, ammonium, (OC-6-22)-(9CI) (CA INDEX NAME)



●  $\text{NH}_4^+$

IT **81915-00-6P**

(prepn. of)

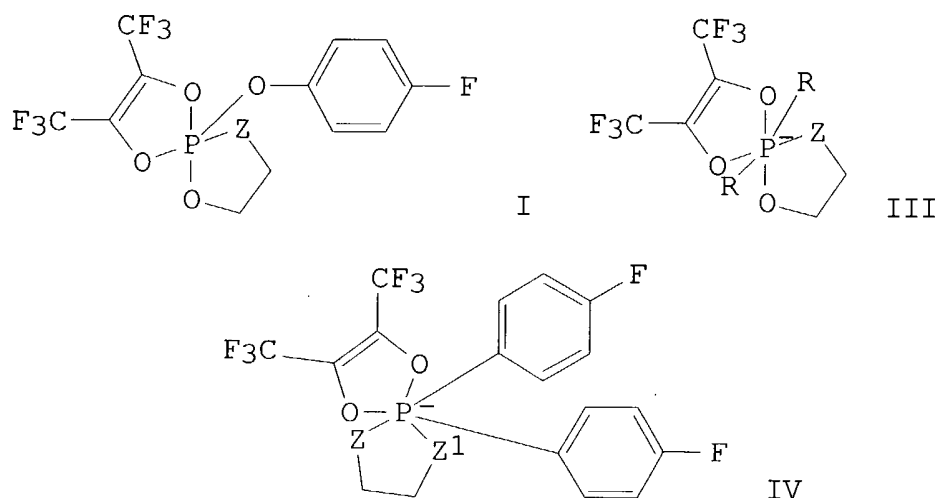
L25 ANSWER 55 OF 61 ZCA COPYRIGHT 2004 ACS on STN

95:149805 Six coordinate phosphorus anions containing

1,3,2-oxathiaphospholane or 1,3,2-oxazaphospholidine rings. Font  
Freide, Joep J. H. M.; Trippett, Stuart (Dep. Chem., Univ.

Leicester, Leicester, LE1 7RH, UK). Journal of Chemical Research, Synopses (7), 218-19 (English) 1981. CODEN: JRPSDC. ISSN: 0308-2342.

GI



AB Treatment of the thiaphosphorane I (Z = S) (II) with p-FC<sub>6</sub>H<sub>4</sub>ONa (THF, -80°) gave the trans anion III (R = p-FC<sub>6</sub>H<sub>4</sub>O, Z = S), which on warming to -60° gave the 2 cis isomers IV (Z = S, Z1 = O; Z = O, Z1 = S). With Bu<sub>4</sub>N<sup>+</sup> F<sup>-</sup>, II gave III (R = F, Z = S) and 1 cis isomer. The analogous reactions of I (Z = NMe) gave III (R = p-FC<sub>6</sub>H<sub>4</sub>O, F; Z = NMe) and 4 and 3 cis isomers, resp. This multiplicity of cis isomers, and the asymmetry of III (R = F, Z = NMe), are assocd. with the N. This is either nonplanar or planar with the oxazaphospholidine ring twisted, owing to repulsion between the filled p-orbital on the N and the σ-framework. The barrier to interconversion of pairs of these cis isomers is 10-11 kcal/mol.

IT **79199-65-8P 79199-67-0P 79199-71-6P**  
(prepn. and configuration of)

RN 79199-65-8 ZCA

CN 1-Butanaminiun, N,N,N-tributyl-, (OC-6-32)-difluoro[1,1,1,4,4,4-hexafluoro-2-butene-2,3-diolato(2-)-O,O'] [2-(methylamino)ethanolato(2-)-N,O]phosphate(1-) (9CI) (CA INDEX NAME)

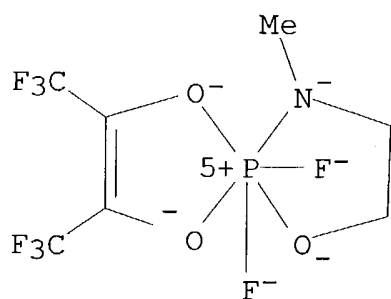
CM 1

CRN 79199-64-7

CMF C7 H7 F8 N O3 P

CCI CCS

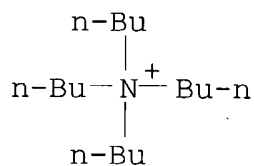




CM 2

CRN 10549-76-5

CMF C16 H36 N



RN 79199-67-0 ZCA

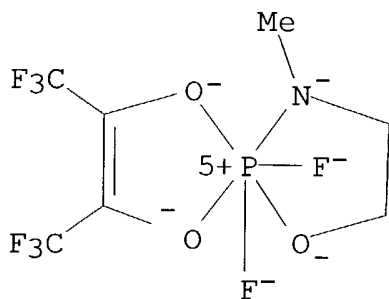
CN 1-Butanaminium, N,N,N-tributyl-, (OC-6-42)-difluoro[1,1,1,4,4,4-hexafluoro-2-butene-2,3-diolato(2-)-O,O'] [2-(methylamino)ethanolato(2-)-N,O]phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 79199-66-9

CMF C7 H7 F8 N O3 P

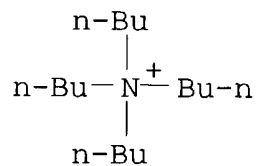
CCI CCS



CM 2

CRN 10549-76-5

CMF C16 H36 N



RN 79199-71-6 ZCA

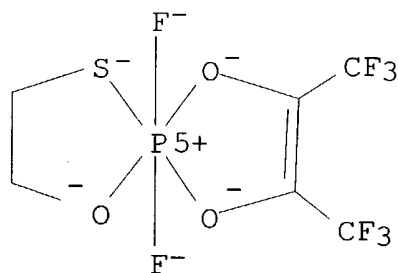
CN 1-Butanaminium, N,N,N-tributyl-, difluoro[1,1,1,4,4,4-hexafluoro-2-butene-2,3-diolato(2-)-O,O'] [2-mercaptoethanolato(2-)-O,S]phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 79199-70-5

CMF C6 H4 F8 O3 P S

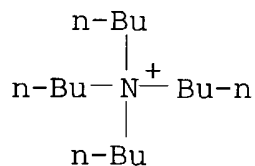
CCI CCS



CM 2

CRN 10549-76-5

CMF C16 H36 N



IT 79147-40-3P  
(prepn. and isomerization of)

RN 79147-40-3 ZCA

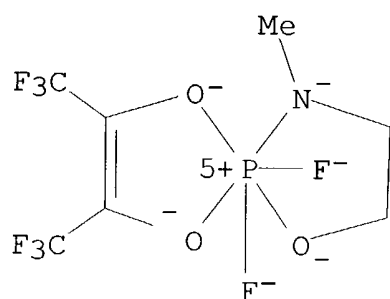
CN 1-Butanaminium, N,N,N-tributyl-, (OC-6-14)-difluoro[1,1,1,4,4,4-hexafluoro-2-butene-2,3-diolato(2-)-O,O'] [2-(methylamino)ethanolato(2-)-N,O]phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 79147-39-0

CMF C7 H7 F8 N O3 P

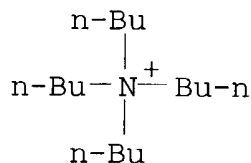
CCI CCS



CM 2

CRN 10549-76-5

CMF C16 H36 N



IT 79147-43-6P

(prepn. of)

RN 79147-43-6 ZCA

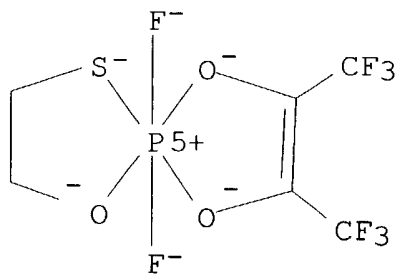
CN 1-Butanaminium, N,N,N-tributyl-, (OC-6-32)-difluoro[1,1,1,4,4,4-hexafluoro-2-butene-2,3-diolato(2-)-O,O'] [2-mercaptoethanolato(2-)-O,S]phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 79147-42-5

CMF C6 H4 F8 O3 P S

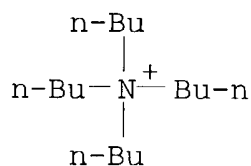
CCI CCS



CM 2

CRN 10549-76-5

CMF C16 H36 N

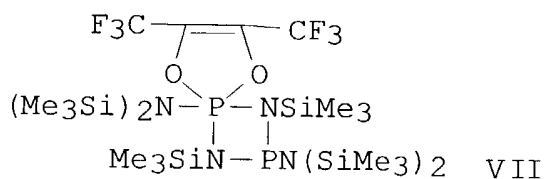
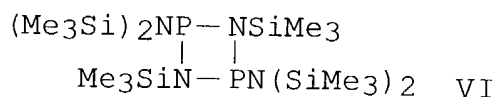
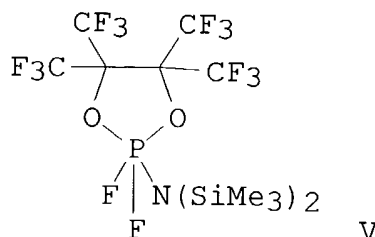
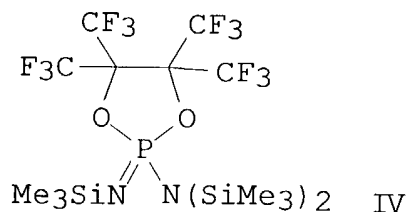
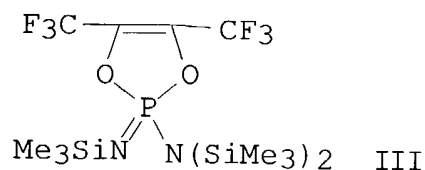
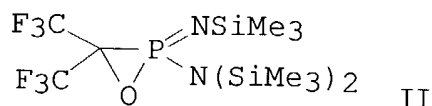


- IT 79199-65-8P 79199-67-0P 79199-71-6P  
 (prepn. and configuration of)  
 IT 79147-40-3P  
 (prepn. and isomerization of)  
 IT 79147-43-6P  
 (prepn. of)

L25 ANSWER 56 OF 61 ZCA COPYRIGHT 2004 ACS on STN

89:215500 Reactions of an N-silylated iminophosphine (phospha(III)azene) with perfluorinated ketones. Roeschenthaler, Gerd Volker; Sauerbrey, Karl; Schmutzler, Reinhard (Tech. Univ. Braunschweig, Braunschweig, Fed. Rep. Ger.). Chemische Berichte, 111(9), 3105-11 (German) 1978. CODEN: CHBEAM. ISSN: 0009-2940.

GI



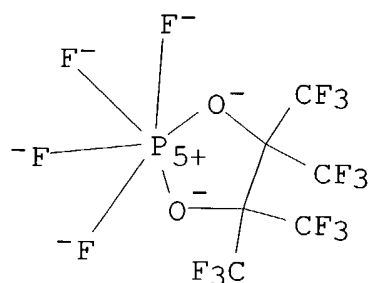
AB Cycloaddn. of hexafluoroacetone to (Me<sub>3</sub>Si)<sub>2</sub>NP:NSiMe<sub>3</sub> (I) furnishes the novel 3-membered ring compd. II, the 1st isolable product of this type involving a main group element. I reacts with perfluorobiacetyl to form the dioxaphosphole III. The analogous dioxaphospholane IV is obtained in the reaction of LiN(SiMe<sub>3</sub>)<sub>2</sub> with the phospholane V. The product (VI), resulting from dimerization of I, oxidatively adds only 1 mol. of perfluorobiacetyl with formation of the diazadiphosphetidine VII.

IT **68402-98-2P**

(prepn. of)

RN 68402-98-2 ZCA

CN Phosphate(1-), tetrafluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-κO,κO']-, lithium, (OC-6-22)-(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 68402-98-2P  
(prepn. of)

L25 ANSWER 57 OF 61 ZCA COPYRIGHT 2004 ACS on STN

83:79123 Fluorophosphoranes containing the perfluoropinacolyl ring system. II. Synthesis and nuclear magnetic resonance studies. Gibson, James Andrew; Roeschenthaler, Gerd V.; Schmutzler, Reinhard (Anorg. Chem., Tech. Univ. Braunschweig, Braunschweig, Fed. Rep. Ger.). Journal of the Chemical Society, Dalton Transactions: Inorganic Chemistry (1972-1999) (10), 918-24 (English) 1975. CODEN: JCDTBI. ISSN: 0300-9246.

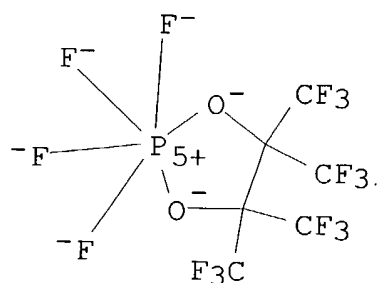
GI For diagram(s), see printed CA Issue.

AB RPF<sub>2</sub> [R = Me, Me<sub>3</sub>C, Ph, Et<sub>2</sub>N, (Me<sub>3</sub>Si)<sub>2</sub>N] with (CF<sub>3</sub>)<sub>2</sub>CO gave 85-100% fluorophosphoranes (I) contg. the perfluoropinacolyl ring system. I were characterized by ir and mass spectra. Intramol. exchange of ligands by I was studied by NMR. I (R = F) is a strong acceptor and complexes were prepd. with Me<sub>3</sub>P and CsF.

IT 56815-82-8P  
(prepn. of)

RN 56815-82-8 ZCA

CN Phosphate(1-), tetrafluoro[1,1,1,4,4,4-hexafluoro-2,3-bis(trifluoromethyl)-2,3-butanediolato(2-)-O,O']-, cesium, (OC-6-22)- (9CI) (CA INDEX NAME)



● Cs<sup>+</sup>

IT 56815-82-8P  
(prepn. of)

L25 ANSWER 58 OF 61 ZCA COPYRIGHT 2004 ACS on STN

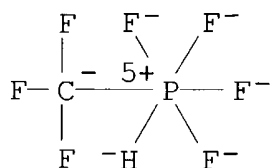
73:72654 Phosphorus-fluorine compounds. XIX. Syntheses of, and nuclear magnetic resonance spectral studies on, hexacoordinate fluorophosphate anions containing phosphorus-hydrogen bonds. Nixon, John F.; Swain, J. R. (Chem. Lab., Univ. Sussex, Brighton, UK). Journal of the Chemical Society [Section] A: Inorganic, Physical, Theoretical (12), 2075-80 (English) 1970. CODEN: JCSIAP. ISSN: 0022-4944.

AB KHF<sub>2</sub> reacts with fluorophosphines RnPF<sub>3-n</sub> (R = CF<sub>3</sub>, n = 0-2), to afford salts contg. the octahedral fluoro-hydridophosphate anions [RnPF<sub>5-n</sub>H]<sup>-</sup>. The pentafluorohydridophosphate ion, [PF<sub>5</sub>H]<sup>-</sup>, has also been obtained from reactions between (a) trifluorophosphine and dimethylamine and (b) (dimethylamino)difluorophosphine and KHF<sub>2</sub>. Dimethylaminolysis of fluorobis(trifluoromethyl)phosphine affords (dimethylamino)bis(trifluoromethyl)phosphine and salts of trifluorohydridobis(trifluoromethyl)phosphate [(CF<sub>3</sub>)<sub>2</sub>PF<sub>3</sub>H]<sup>-</sup>, and tetrafluorobis(trifluoromethyl)phosphate ions [(CF<sub>3</sub>)<sub>2</sub>PF<sub>4</sub>]<sup>-</sup>. <sup>1</sup>H and <sup>19</sup>F NMR studies confirm the formulas of these novel anions and provide information about their stereochemistry.

IT 27900-96-5P 27900-97-6P 27900-98-7P  
(prepn. of)

RN 27900-96-5 ZCA

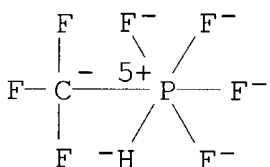
CN Phosphate(1-), tetrafluorohydro(trifluoromethyl)-, potassium, trans-(8CI) (CA INDEX NAME)



● K<sup>+</sup>

RN 27900-97-6 ZCA

CN Phosphate(1-), tetrafluorohydro(trifluoromethyl)-, potassium, cis-(8CI) (CA INDEX NAME)

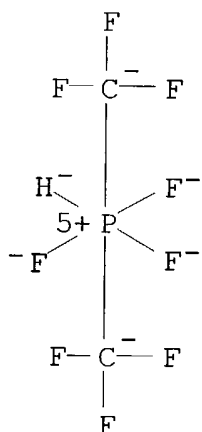


● K<sup>+</sup>

RN 27900-98-7 ZCA

CN Phosphate(1-), trifluorohydrobis(trifluoromethyl)-, potassium, stereoisomer (8CI) (CA INDEX NAME)





● K<sup>+</sup>

IT 27900-96-5P 27900-97-6P 27900-98-7P  
(prepn. of)

L25 ANSWER 59 OF 61 ZCA COPYRIGHT 2004 ACS on STN

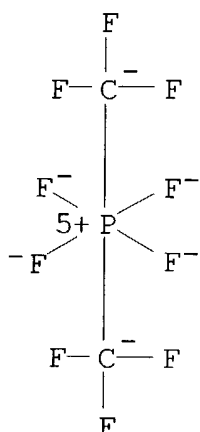
72:138192 Partial second-order effects in [AmBnX] systems;  
reinterpretation of the fluorine-19 nuclear magnetic resonance  
spectrum of cesium trans-bis(trifluoromethyl)tetrafluorophosphate,  
Cs+[(CF<sub>3</sub>)<sub>2</sub>PF<sub>4</sub>]-. Bishop, Edward O.; Carey, P. R.; Nixon, J. F.;  
Swain, J. R. (Sch. Mol. Sci., Univ. Sussex, Brighton, UK). Journal  
of the Chemical Society [Section] A: Inorganic, Physical,  
Theoretical (7), 1074-6 (English) 1970. CODEN: JCSIAP. ISSN:  
0022-4944.

AB If some but not all multiplets of a NMR spectrum show 2nd-order  
effects, the relative signs of certain coupling consts. are thereby  
known. The 19F spectrum of the title compd. is reinterpreted in  
this light, and general applications are discussed. Exact  
parameters can be found simply by 1st-order interpretation of such a  
spectrum.

IT 18114-91-5  
(nuclear magnetic resonance of)

RN 18114-91-5 ZCA

CN Phosphate(1-), tetrafluorobis(trifluoromethyl)-, cesium, trans-  
(8CI) (CA INDEX NAME)

● Cs<sup>+</sup>

IT 18114-91-5  
(nuclear magnetic resonance of)

L25 ANSWER 60 OF 61 ZCA COPYRIGHT 2004 ACS on STN

71:81483 Formation of trifluoromethylated fluoro phosphates by reaction of trimethyltrifluoromethyltin with phosphorus(V) fluoride. Jander, Jochen; Boerner, Dieter; Engelhardt, Udo (Freie Univ., Berlin, Fed. Rep. Ger.). Justus Liebigs Annalen der Chemie, 726, 19-24 (German) 1969. CODEN: JLACBF. ISSN: 0075-4617.

AB PF<sub>5</sub> reacted with Me<sub>3</sub>SnCF<sub>3</sub> to give a white hygroscopic ppt. that slowly gave off PF<sub>5</sub>; the anions formed are pptd. from CH<sub>2</sub>Cl<sub>2</sub> as stable (Ph<sub>4</sub>As)(PF<sub>5</sub>CF<sub>3</sub>) and (Ph<sub>4</sub>As)[PF<sub>4</sub>(CF<sub>3</sub>)<sub>2</sub>]. Their structures were established from ir and <sup>19</sup>F N.M.R. data and a mechanism of formation is discussed.

IT 23940-74-1P 23940-75-2P  
(prepn. of)

RN 23940-74-1 ZCA

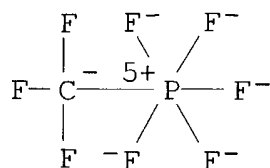
CN Arsonium, tetraphenyl-, pentafluoro(trifluoromethyl)phosphate(1-)  
(8CI) (CA INDEX NAME)

CM 1

CRN 44863-49-2

CMF C F8 P

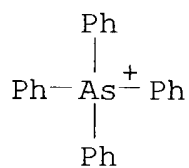
CCI CCS



CM 2

CRN 15912-80-8

CMF C24 H20 As



RN 23940-75-2 ZCA

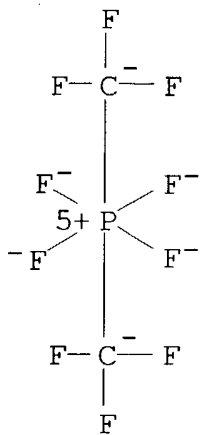
CN Arsonium, tetraphenyl-, tetrafluorobis(trifluoromethyl)phosphate(1-)  
(8CI) (CA INDEX NAME)

CM 1

CRN 45043-58-1

CMF C2 F10 P

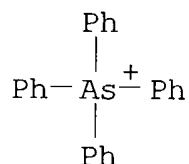
CCI CCS



CM 2

CRN 15912-80-8

CMF C24 H20 As



IT 23940-74-1P 23940-75-2P  
(prepn. of)

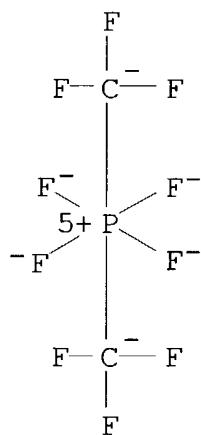
L25 ANSWER 61 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
68:114717 Trifluoromethyl-substituted fluorophosphates and fluoroarsenates. Chan, S. S.; Willis Christopher J. (Univ. Western Ontario, London, ON, Can.). Canadian Journal of Chemistry, 46(8), 1237-48 (English) 1968. CODEN: CJCHAG. ISSN: 0008-4042.

AB Synthetic routes were developed to salts contg. the anions [CF<sub>3</sub>PF<sub>5</sub>]-, [(CF<sub>3</sub>)<sub>2</sub>PF<sub>4</sub>]-, [(CF<sub>3</sub>)<sub>3</sub>AsF<sub>4</sub>]-, [(CF<sub>3</sub>)<sub>2</sub>AsF<sub>4</sub>]-, and [(CF<sub>3</sub>)<sub>3</sub>AsF<sub>3</sub>]-. These are isolated as stable solids with Cs<sup>+</sup>, or sometimes Ag<sup>+</sup>, as the cation. Their 19F N.M.R. spectra are discussed, and it is suggested that the bis- and tris(trifluoromethyl)-substituted fluorophosphates have a trans configuration. Trimethyltrifluoromethyltin, Me<sub>3</sub>SnCF<sub>3</sub>, forms 1:1 complexes with PF<sub>5</sub>, (CF<sub>3</sub>)<sub>2</sub>PF<sub>3</sub>, and (CF<sub>3</sub>)<sub>3</sub>PF<sub>2</sub>. It is suggested that transfer of a trifluoromethyl group as CF<sub>3</sub>- has occurred here, leading to the formation of trimethyltin derivs. of the trifluoromethyl-substituted fluorophosphates. 22 references.

IT 18114-91-5P 18128-78-4P 18128-79-5P  
18757-45-4P 18757-46-5P 18757-47-6P  
26062-20-4P  
(prepn. of)

RN 18114-91-5 ZCA

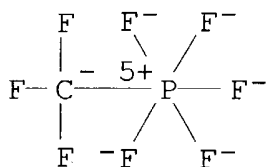
CN Phosphate(1-), tetrafluorobis(trifluoromethyl)-, cesium, trans-(8CI) (CA INDEX NAME)



● Cs<sup>+</sup>

RN 18128-78-4 ZCA

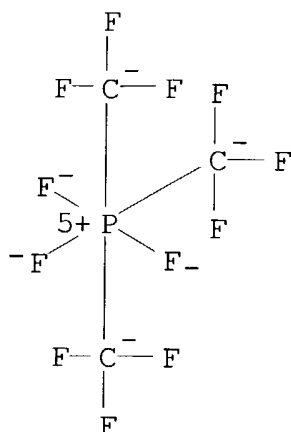
CN Phosphate(1-), pentafluoro(trifluoromethyl)-, cesium (8CI) (CA INDEX NAME)



● Cs<sup>+</sup>

RN 18128-79-5 ZCA

CN Phosphate(1-), trifluorotris(trifluoromethyl)-, cesium, trans- (8CI) (CA INDEX NAME)



● Cs<sup>+</sup>

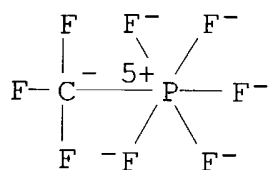
RN 18757-45-4 ZCA  
 CN Stannylum, trimethyl-, (OC-6-21)-pentafluoro(trifluoromethyl)phosph  
 ate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 44863-49-2

CMF C F8 P

CCI CCS

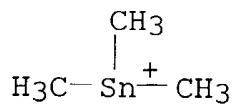


CM 2

CRN 5089-96-3

CMF C3 H9 Sn

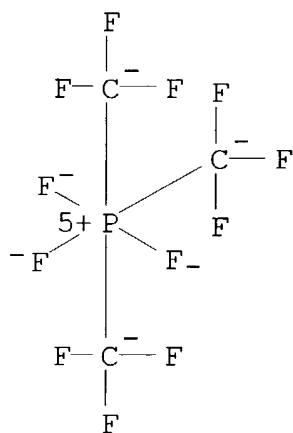
CCI CCS



RN 18757-46-5 ZCA  
 CN Stannylum, trimethyl-, (OC-6-21)-trifluorotris(trifluoromethyl)phosphate(1-) (9CI) (CA INDEX NAME)

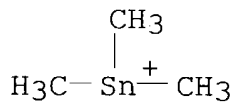
CM 1

CRN 45166-84-5  
 CMF C3 F12 P  
 CCI CCS



CM 2

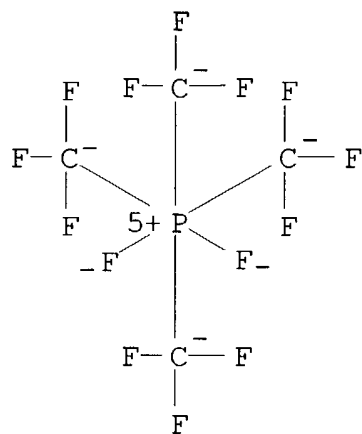
CRN 5089-96-3  
 CMF C3 H9 Sn  
 CCI CCS



RN 18757-47-6 ZCA  
 CN Stannylum, trimethyl-, difluorotetrakis(trifluoromethyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 45224-05-3  
 CMF C4 F14 P  
 CCI CCS

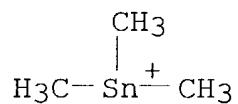


CM 2

CRN 5089-96-3

CMF C3 H9 Sn

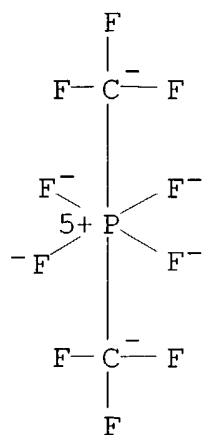
CCI CCS



RN 26062-20-4 ZCA

CN Phosphate(1-), tetrafluorobis(trifluoromethyl)-, silver(1+), trans-(8CI) (CA INDEX NAME)



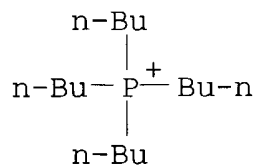


● Ag(I) <sup>+</sup>

IT 18114-91-5P 18128-78-4P 18128-79-5P  
 18757-45-4P 18757-46-5P 18757-47-6P  
 26062-20-4P  
 (prepn. of)

CRN 15853-37-9

CMF C16 H36 P



RN 482635-83-6 ZCA

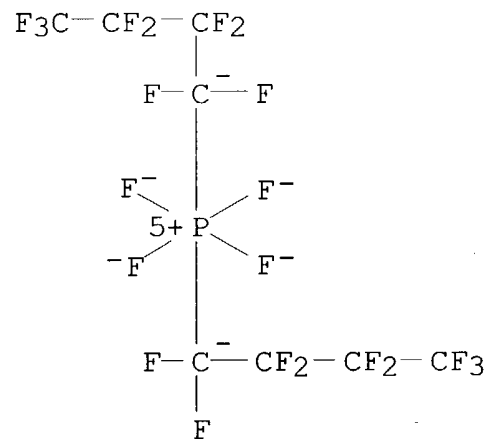
CN Ethanaminium, N,N,N-triethyl-, tetrafluorobis(nonafluorobutyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 482635-82-5

CMF C8 F22 P

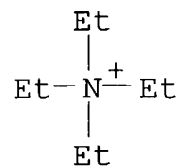
CCI CCS



CM 2

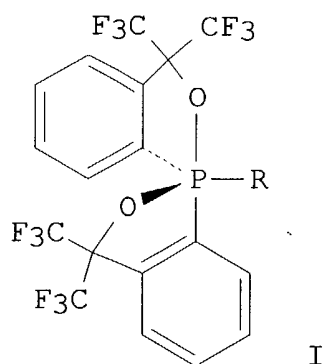
CRN 66-40-0

CMF C8 H20 N



- IT 482635-70-1P 482635-71-2P 482635-72-3P  
 482635-73-4P 482649-24-1P,  
 Trifluorotris(heptafluoro-1-propyl)phosphate, acid salt  
 482649-25-2P, Trifluorotris(nonafluoro-1-butyl)phosphate,  
 acid salt  
 (synthesis, properties, and uses of (perfluoroalkyl)phosphorane-  
 based novel strong acids and acid salts as catalysts, solvents,  
 ionic liqs., and battery electrolytes)
- IT 403699-22-9P 463944-41-4P 482635-76-7P  
 482635-77-8P 482635-78-9P 482635-79-0P  
 482635-80-3P 482635-81-4P 482635-83-6P  
 (synthesis, properties, and uses of (perfluoroalkyl)phosphorane-  
 based novel strong acids and acid salts as catalysts, solvents,  
 ionic liqs., and battery electrolytes)
- L25 ANSWER 18 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
 138:24787 Characteristic Reactions and Properties of C-Apical  
 O-Equatorial (O-cis) Spirophosphoranes: Effect of the  $\sigma$ P-O  
 Orbital in the Equatorial Plane and Isolation of a Hexacoordinate  
 Oxaphosphetane as an Intermediate of the Wittig Type Reaction of  
 10-P-5 Phosphoranes. Matsukawa, Shiro; Kojima, Satoshi; Kajiyama,  
 Kazumasa; Yamamoto, Yohsuke; Akiba, Kin-ya; Re, Suyong; Nagase,  
 Shigeru (Department of Chemistry, Graduate School of Science,  
 Hiroshima University, Higashi-Hiroshima, 739-8526, Japan). Journal  
 of the American Chemical Society, 124(44), 13154-13170 (English)  
 2002. CODEN: JACSAT. ISSN: 0002-7863. OTHER SOURCES: CASREACT  
 138:24787. Publisher: American Chemical Society.

GI



- AB Novel spirophosphoranes (O-cis) (e.g., I, wherein R = Me, n-Bu, PhCH<sub>2</sub>, p-FC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>) that exhibit reversed apicophilicity having an apical carbon-equatorial oxygen array in a five-membered ring showed enhanced reactivity toward nucleophiles such as n-Bu<sub>4</sub>N<sup>+</sup>F<sup>-</sup> or MeLi in

comparison with the corresponding stable isomeric spirophosphoranes (O-trans) having an apical oxygen-equatorial carbon configuration. The enhanced reactivity of the O-cis isomer could be explained by the presence of a lower-lying  $\sigma^*P-O$ (equatorial) orbital as the reacting orbital in the equatorial plane, whereas the corresponding orbital is a higher-lying  $\sigma^*P-C$ (equatorial) in the O-trans isomer. D. functional theory (DFT) calcn. on the actual compds. provided theor. support for this assumption. In addn., the benzylic anion  $\alpha$  to the phosphorus atom in O-cis benzyl phosphorane is much more stable than that generated from the corresponding O-trans compds. The exptl. results are due to the  $nC \rightarrow \sigma^*P-O$  interaction in the O-cis anion, and this was confirmed by DFT calcns. Furthermore, the hexacoordinate anionic species derived from the reaction of the benzylic anion from O-cis benzylphosphorane with an aldehyde was also found to be stabilized as compared with analogous species from the corresponding O-trans isomer. The first x-ray structural characterization of a hexacoordinate phosphate intermediate in the Wittig type reaction using pentacoordinate phosphoranes is reported.

IT 477975-23-8P

(characteristic reactions and properties of spirophosphoranes)

RN 477975-23-8 ZCA

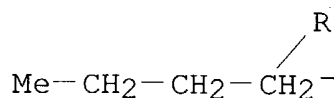
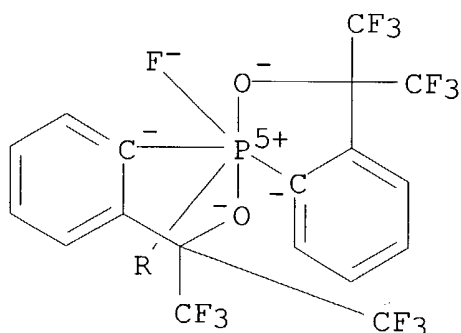
CN 1-Butanaminium, N,N,N-tributyl-, (OC-6-23)-bis[ $\alpha$ , $\alpha$ -bis(trifluoromethyl)benzenemethanolato(2-)- $\kappa C2, \kappa O1$ ]butylfluorophosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 477975-22-7

CMF C22 H17 F13 O2 P

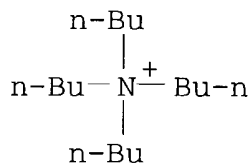
CCI CCS



CM 2

CRN 10549-76-5

CMF C16 H36 N



IT 477975-23-8P

(characteristic reactions and properties of spirophosphoranes)

L25 ANSWER 19 OF 61 ZCA COPYRIGHT 2004 ACS on STN

138:24781 Effect of  $\sigma^*P-O$  orbital on structure, stereomutation, and reactivity of C-apical O-equatorial spirophosphoranes. Akiba, Kin-ya; Matsukawa, Shiro; Adachi, Takahiro; Yamamoto, Yohsuke; Re, Suyong; Nagase, Shigeru (Advanced Research Center for Science and Engineering, Waseda University, Tokyo, 169-8555, Japan). Phosphorus, Sulfur and Silicon and the Related Elements, 177(6-7), 1671-1675 (English) 2002. CODEN: PSSLEC. ISSN: 1042-6507. OTHER SOURCES: CASREACT 138:24781. Publisher: Taylor & Francis Ltd..

AB Effect of  $\sigma^*P-O$  orbital of C-apical O-equatorial (O-cis) spirophosphorane was studied both exptl. and theor. O-cis phosphoranes revealed to be much more electrophilic on the P atom than O-trans isomers by exptl. studies. Theor., the energy of the

$\sigma^*P-O$  orbital of O-cis phosphorane is lower than that of the  $\sigma^*P-C$  orbital of O-trans phosphorane by 18.7 kcal/mol, and the result supports the enhanced electrophilicity of O-cis spirophosphoranes compared with O-trans isomer.

IT 477975-23-8P

(prepn. of)

RN 477975-23-8 ZCA

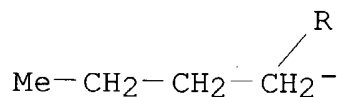
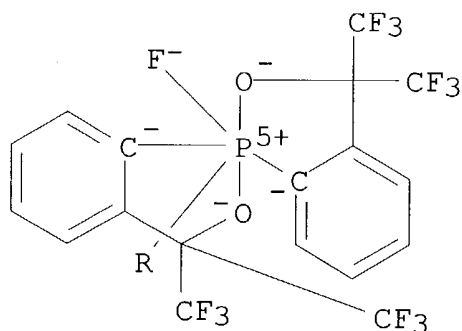
CN 1-Butanaminium, N,N,N-tributyl-, (OC-6-23)-bis[ $\alpha,\alpha$ -bis(trifluoromethyl)benzenemethanolato(2-)- $\kappa C2,\kappa O1$ ]butylfluorophosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 477975-22-7

CMF C22 H17 F13 O2 P

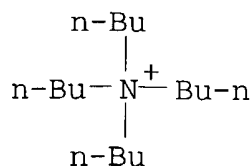
CCI CCS



CM 2

CRN 10549-76-5

CMF C16 H36 N



IT 477975-23-8P  
(prepn. of)

L25 ANSWER 20 OF 61 ZCA COPYRIGHT 2004 ACS on STN

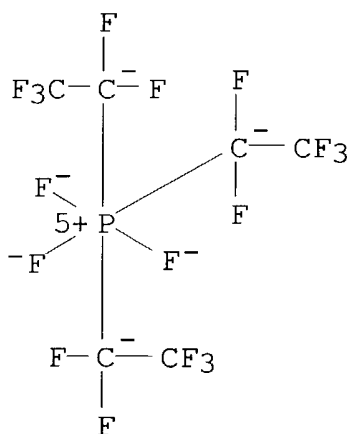
137:386904 Advanced electrolytes. Oesten, R.; Heider, U.; Schmidt, M. (Merck Japan Ltd., Meguro-ku, Tokyo, 153-8927, Japan). Solid State Ionics, 148(3,4), 391-397 (English) 2002. CODEN: SSIOD3. ISSN: 0167-2738. Publisher: Elsevier Science B.V..

AB The challenges are the optimization of parameters such as long-term cycling stability, rate capability, low temp. performance and safety features. At least the first two aspects are mainly influenced by the electrolyte. Consequently, with the aim to improve the overall performance of lithium ion batteries, one has to address surface film formation and bulk properties of the electrolyte. With the special quality of vinylene carbonate (VC), and the new salt, lithium fluoroalkylphosphate Li[(C2F5)3PF3], we discuss the properties of the new compds. for advanced electrolytes used in high-energy lithium ion batteries. Results of the electrochem. studies in comparison to std. vinylene carbonate with respect to LiPF6 are reported. In addn., the influence of Li[(C2F5)3PF3] on the flammability of non-aq. electrolytes is demonstrated.

IT 206057-04-7  
(battery electrolytes)

RN 206057-04-7 ZCA

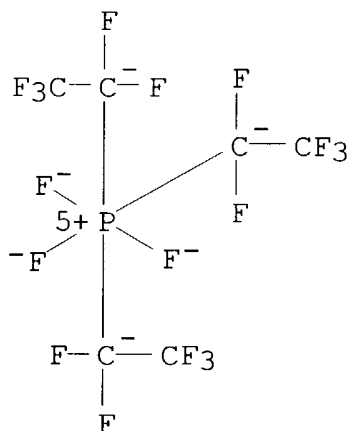
CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 206057-04-7  
(battery electrolytes)

- L25 ANSWER 21 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
 137:281812 Electric battery.. Adachi, Momoe; Fujita, Shigeru (Sony Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2002280066 A2 20020927, 16 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2001-78610 20010319.
- AB Electrolytes for Li secondary batteries contain  $\text{LiPFa}[\text{CHnFm}(\text{CF}_3)_p]6-\text{a}$  ( $\text{a} = 1-5$ ;  $\text{n} = 0,1$ ;  $\text{m} = 0-3$ ;  $\text{p} = 0-2$ ;  $\text{n} + \text{m} + \text{p} = 3$ ). The electrolyte shows high cond., excellent thermal stability, and oxidn. resistance. The batteries exhibit high discharge capacity and improved service life.
- IT **403699-22-9**, Lithium trifluorotris(perfluoroethyl)phosphate (electrolyte for secondary battery with improved service and storage life)
- RN 403699-22-9 ZCA
- CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)



●  $\text{Li}^+$

- IT **403699-22-9**, Lithium trifluorotris(perfluoroethyl)phosphate (electrolyte for secondary battery with improved service and storage life)
- L25 ANSWER 22 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
 137:265682 Procedure for the production of fluoroalkylphosphates. Schmidt, Michael; Kuehner, Andreas; Jungnitz, Michael; Ott, Frank; Ignatyev, Nicolai (Merck Patent G.m.b.H., Germany). Ger. DE 10119278 C1 20021002, 8 pp. (German). CODEN: GWXXAW. APPLICATION: DE 2001-10119278 20010420.
- AB A procedure to produce F alkyl phosphates with the general formula



$Mn+[PF_x(CyF_{2y+1-z}Hz)_6-x]_n$  where  $1 \leq x \leq 6$ ,  
 $1 \leq y \leq 8$ ,  $0 \leq z \leq 2y+1$ ,  $1 \leq n \leq 3$  and

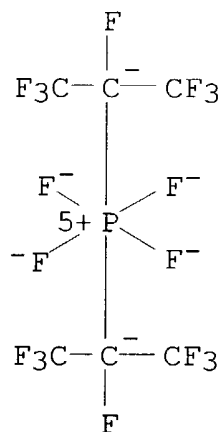
$Mn^{+}$  is a mono-, di- or trivalent cation. Suitable cations include Li; Na; K; Mg; Rb; Cs; arom. heterocyclic cations;  $NR_1R_2R_3R_4$ ;  $PR_1R_2R_3R_4$ ;  $P[(NR_1R_2)_kR_3mR_4^{4-k-m}]$  with  $k=1-4$ ,  $m=0,3$  and  $k+m \leq 4$ ;  $C(NR_1R_2)(NR_3R_4)(NR_5R_6)$ ;  $C(Aryl)_3$ ; Rb or Tropylium; and where  $R_1$  to  $R_6$  is H, Alkyl and Aryl(C1-C8) that can be partially substituted with F, Cl or Br. The fluoralkylphosphoranes are converted into the required product with metal or nonmetal fluorides without using solvents in the process. These salts are suitable electrolytes in batteries, condensers, supercondensers and galvanic cells.

IT 205926-54-1P 206057-04-7P 463944-41-4P  
 463944-42-5P

(prodn. of fluoroalkylphosphates)

RN 205926-54-1 ZCA

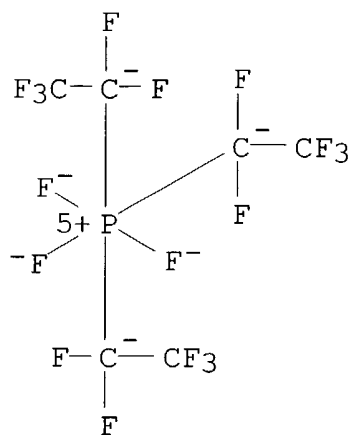
CN Phosphate(1-), tetrafluorobis[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-, lithium (9CI) (CA INDEX NAME)



●  $Li^+$

RN 206057-04-7 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-  
 (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 463944-41-4 ZCA

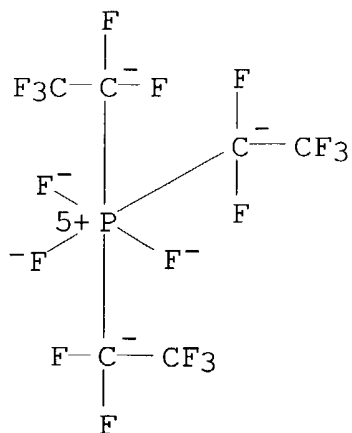
CN Ethanaminium, N,N,N-triethyl-, trifluorotris(pentafluoroethyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 429679-87-8

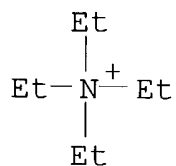
CMF C6 F18 P

CCI CCS

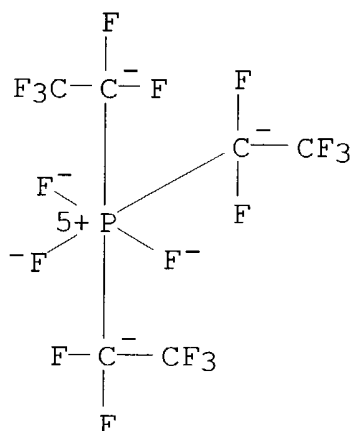


CM 2

CRN 66-40-0  
CMF C8 H20 N



RN 463944-42-5 ZCA  
CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, potassium (9CI)  
(CA INDEX NAME)



IT 205926-54-1P 206057-04-7P 463944-41-4P  
463944-42-5P  
(prodn. of fluoroalkylphosphates)

L25 ANSWER 23 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
137:217076 Preparation of fluoroalkylphosphate salts as electrolytes for primary and secondary batteries. Schmidt, Michael; Kuehner, Andreas; Ignatyev, Nikolai; Satori, Peter (Merck Patent G.m.b.H., Germany). Eur. Pat. Appl. EP 1236732 A1 20020904, 26 pp.  
DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR.  
(German). CODEN: EPXXDW. APPLICATION: EP 2002-1914 20020131.  
PRIORITY: DE 2001-10109032 20010224.

AB The prepn. of title compds., useful as electrolytes for primary and secondary batteries, is described. Thus, reaction of LiF with

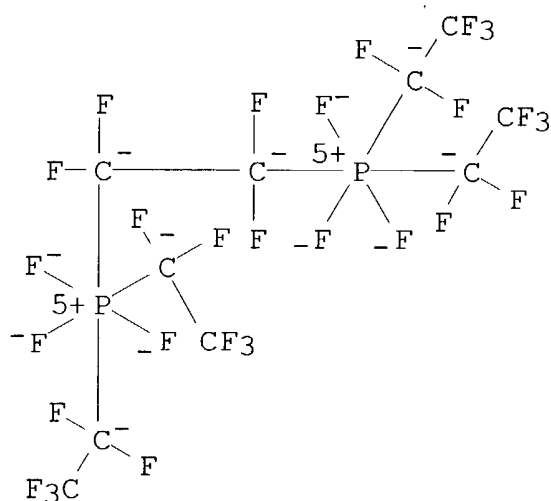
perfluoro-1,2-bis(diethyldifluorophosphorano)ethane in a mixt. of ethylene carbonate/dimethyl carbonate/diethyl carbonate (solvent mixt.) gave the title compd.,  $2\text{Li}^+[(\text{C}_2\text{F}_5)_2\text{PF}_3(\text{CF}_2)_2\text{PF}_3(\text{C}_2\text{F}_5)]^{2-}$ , as a mixt. of stereoisomers. The oxidn. stability of the compd. prepd. is given.

IT **454458-13-0P**

(oxidn. stability; prepn. of fluoroalkylphosphate salts as electrolytes for primary and secondary batteries)

RN 454458-13-0 ZCA

CN Phosphate(2-), hexafluorotetrakis(pentafluoroethyl) [ $\mu$ -(1,1,2,2-tetrafluoro-1,2-ethanediyl)]di-, dilithium (9CI) (CA INDEX NAME)



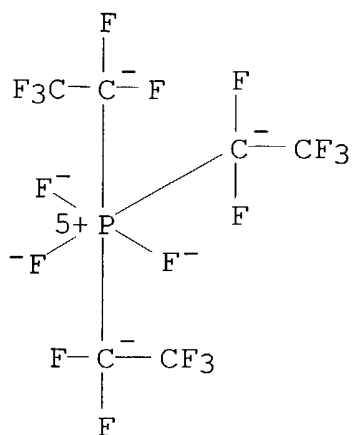
● 2  $\text{Li}^+$

IT **403699-22-9P 454458-15-2P**

(prepn. of fluoroalkylphosphate salts as electrolytes for primary and secondary batteries)

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 454458-15-2 ZCA

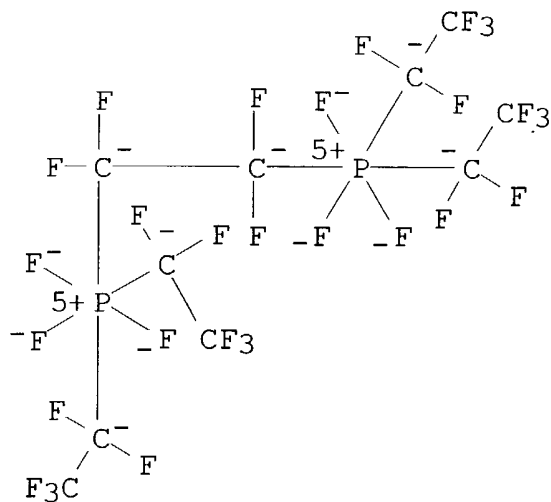
CN Ethanaminium, N,N,N-triethyl-, hexafluorotetrakis(pentafluoroethyl) [μ-(1,1,2,2-tetrafluoro-1,2-ethanediyl)]diphosphate(2-) (2:1) (9CI) (CA INDEX NAME)

CM 1

CRN 454458-14-1

CMF C10 F30 P2

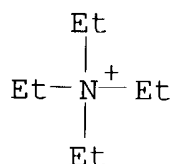
CCI CCS



CM 2

CRN 66-40-0

CMF C8 H20 N



IT 454458-13-0P

(oxidn. stability; prepn. of fluoroalkylphosphate salts as electrolytes for primary and secondary batteries)

IT 403699-22-9P 454458-15-2P

(prepn. of fluoroalkylphosphate salts as electrolytes for primary and secondary batteries)

L25 ANSWER 24 OF 61 ZCA COPYRIGHT 2004 ACS on STN

137:203998 Secondary power source. Che, Yong; Tsushima, Manabu; Morimoto, Takeshi (Asahi Glass Company Ltd., Japan). Eur. Pat. Appl. EP 1239495 A1 20020911, 11 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR. (English). CODEN: EPXXDW. APPLICATION: EP 2002-5229 20020307. PRIORITY: JP 2001-66658 20010309; JP 2001-326301 20011024.

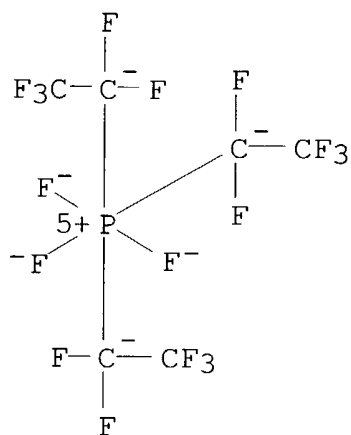
AB A secondary power source, comprises a pos. electrode contg. activated carbon, a neg. electrode contg. (a) Li<sub>4</sub>Ti<sub>5</sub>O<sub>12</sub> or (b) Li<sub>4</sub>Ti<sub>5</sub>O<sub>12</sub>, and a carbon material capable of doping or undoping lithium ions, and an org. electrolyte contg. a lithium salt.

IT 403699-22-9

(secondary power source)

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 403699-22-9  
(secondary power source)

L25 ANSWER 25 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
137:188305 Nonaqueous secondary battery having enhanced discharge capacity retention. Hamamoto, Toshikazu; Abe, Koji; Takai, Tsutomu; Matsumori, Yasuo; Ueki, Akira (Japan). U.S. Pat. Appl. Publ. US 2002122988 A1 20020905, 13 pp., Cont.-in-part of U.S. Ser. No. 631,518. (English). CODEN: USXXCO. APPLICATION: US 2001-21130 20011022. PRIORITY: JP 1999-219708 19990803; US 2000-631518 20000803; JP 2000-321146 20001020; JP 2000-335946 20001102; JP 2000-363656 20001129.

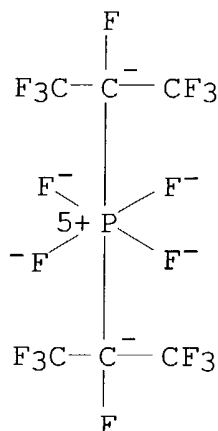
AB The discharge capacity retention of a nonaq. secondary battery is enhanced by incorporating into its nonaq. electrolytic soln. a small amt. of a substituted diphenyldisulfide deriv. in which each of the di-Ph groups has a substituent such as alkoxy, alkenyloxy, alkynyloxy, cycloalkyloxy, aryloxy, acyloxy, alkanesulfonyloxy, arylsulfonyloxy, alkoxycarbonyloxy, aryloxycarbonyloxy, halogen, CF<sub>3</sub>, CCl<sub>3</sub>, or CBr<sub>3</sub>. Preferably, a small amt. of Me 2-propylcarbonate, 2-propynyl methanesulfonate, 1,3-propanesultone, divinylsulfone, 1,4-butanediol dimethanesulfonate or cyclohexylbenzene is further incorporated.

IT 205926-54-1 205926-56-3 365454-70-2  
365460-35-1 403699-22-9  
(nonaq. secondary battery having enhanced discharge capacity retention)

RN 205926-54-1 ZCA

CN Phosphate(1-), tetrafluorobis[1,2,2,2-tetrafluoro-1-

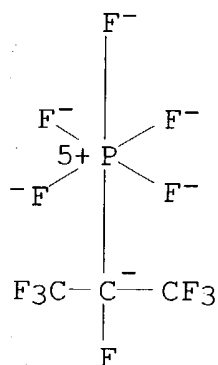
(trifluoromethyl)ethyl]-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 205926-56-3 ZCA

CN Phosphate(1-), pentafluoro[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-, lithium, (OC-6-21)- (9CI) (CA INDEX NAME)

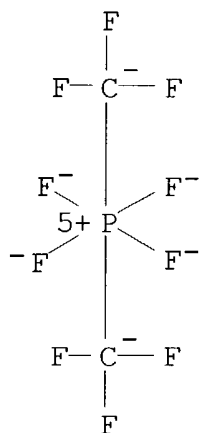


● Li<sup>+</sup>

RN 365454-70-2 ZCA

CN Phosphate(1-), tetrafluorobis(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)

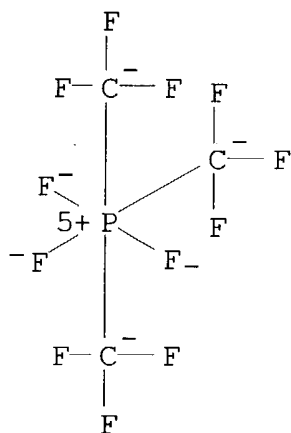




● Li<sup>+</sup>

RN 365460-35-1 ZCA

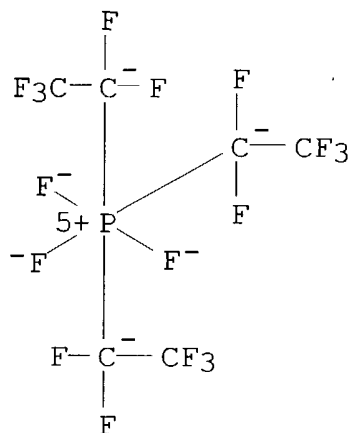
CN Phosphate(1-), trifluorotris(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 205926-54-1 205926-56-3 365454-70-2  
365460-35-1 403699-22-9

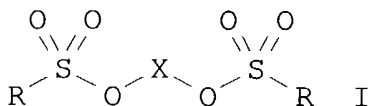
(nonaq. secondary battery having enhanced discharge capacity retention)

L25 ANSWER 26 OF 61 ZCA COPYRIGHT 2004 ACS on STN

137:172410 Nonaqueous electrolyte for lithium secondary battery.

Hamamoto, Toshikazu; Abe, Koji; Takai, Tsutomu; Matsumori, Yasuo  
(Ube Industries, Ltd., Japan). U.S. US 6436582 B1 20020820, 6 pp.  
(English). CODEN: USXXAM. APPLICATION: US 2000-556640 20000424.

GI



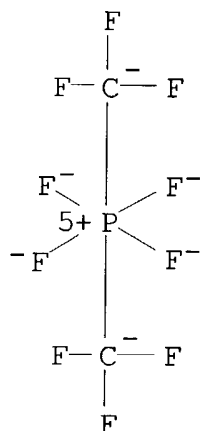
AB A nonaq. electrolyte comprising (i) a nonaq. solvent, (ii) an electrolyte salt dissolved therein and (iii) a disulfonate ester deriv. having the formula (I): wherein R indicates a C1-6 alkyl group and X indicates a straight-chain alkylene group having a C2-6 principal chain or a branched alkylene group having a C2-6 principal chain with at least one side-chain composed of a C1-4 alkyl group, and also a lithium secondary battery using the same are disclosed.

IT 365454-70-2 365460-35-1 403699-22-9

(nonaq. electrolyte for lithium secondary battery)

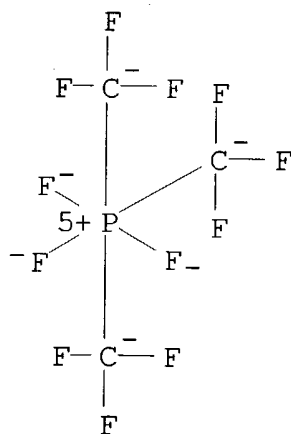
RN 365454-70-2 ZCA

CN Phosphate(1-), tetrafluorobis(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)

● Li<sup>+</sup>

RN 365460-35-1 ZCA

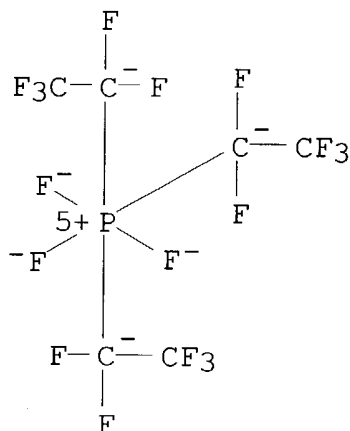
CN Phosphate(1-), trifluorotris(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)

● Li<sup>+</sup>

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA

INDEX NAME)

● Li<sup>+</sup>

IT 365454-70-2 365460-35-1 403699-22-9  
 (nonaq. electrolyte for lithium secondary battery)

L25 ANSWER 27 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
 136:410180 Nonaqueous electrolytes for electrochemical capacitors.  
 Takeda, Masayuki; Takehara, Masahiro; Ue, Makoto (Mitsubishi  
 Chemical Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2002151361 A2  
 20020524, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP  
 2000-347833 20001115.

AB The nonaq. electrolytes contain quaternary onium salts expressed as  
 the formula: Q<sup>+</sup>[(Rf)<sub>n</sub>RF<sub>6-n</sub>], where Q<sup>+</sup> is onium ion, Rf is  
 perfluoroalkyl group, n is integer 1-6. When n is ≥2, plural  
 no. of Rfs can be same or different, and they can bond to form ring  
 structure along with P. The electrolytes are not likely to  
 hydrolytically decompd. compared to tetrafluoroborate.

IT 429679-86-7 429679-88-9 429679-90-3  
 (nonaq. electrolytes for electrochem. capacitors)

RN 429679-86-7 ZCA

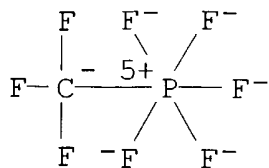
CN Ethanaminium, N,N,N-triethyl-, (OC-6-21)-  
 pentafluoro(trifluoromethyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 44863-49-2

CMF C F8 P

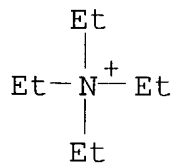
CCI CCS



CM 2

CRN 66-40-0

CMF C8 H20 N



RN 429679-88-9 ZCA

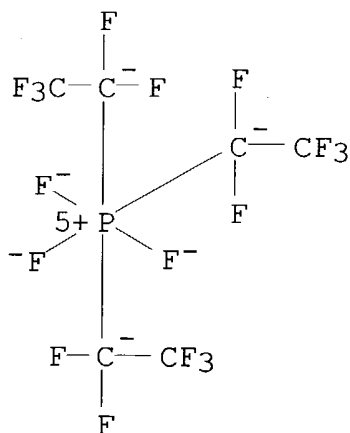
CN Ethanaminium, N,N-diethyl-N-methyl-, trifluorotris(pentafluoroethyl) phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 429679-87-8

CMF C6 F18 P

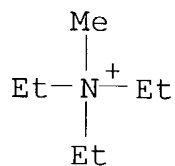
CCI CCS



CM 2

CRN 302-57-8

CMF C7 H18 N



RN 429679-90-3 ZCA

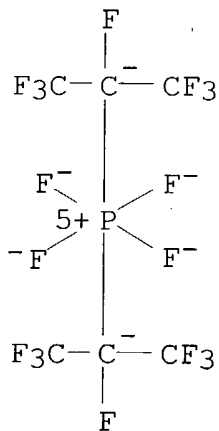
CN Methanaminium, N,N,N-trimethyl-, tetrafluorobis[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 429679-89-0

CMF C6 F18 P

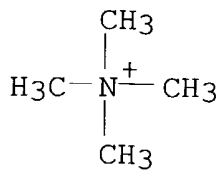
CCI CCS



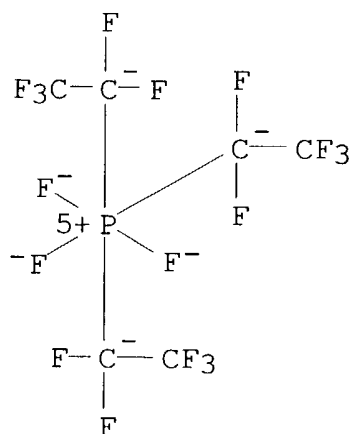
CM 2

CRN 51-92-3

CMF C4 H12 N



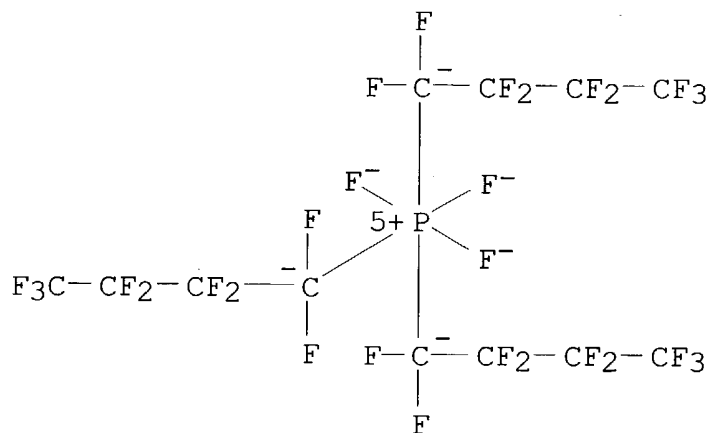
- IT 429679-86-7 429679-88-9 429679-90-3  
(nonaq. electrolytes for electrochem. capacitors)
- L25 ANSWER 28 OF 61 ZCA COPYRIGHT 2004 ACS on STN  
136:388473 Perfluoroalkyl phosphate salt, organic solvent, and polymer mixtures as electrolytes. Schmidt, Michael; Ott, Frank; Jungnitz, Michael; Ignatyev, Nicolai; Kuehner, Andreas (Merck Patent GmbH, Germany). Eur. Pat. Appl. EP 1205998 A2 20020515, 16 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR. (German). CODEN: EPXXDW. APPLICATION: EP 2001-124178 20011011. PRIORITY: DE 2000-10055812 20001110; DE 2000-10058264 20001123.
- AB Electrolytes for batteries, condensers, supercondensers, and galvanic cells consist of: (1) a fluoroalkyl phosphate salt of general formula  $Mn^+ ([PF_x(CyF_{2y+1-z}Hz)_6-x]^-)_n$  in which  $Mn^+$  is a monovalent, divalent, or trivalent cation,  $x = 1-5$ ;  $1 \leq y \leq 8$ ; and  $z = 2y + 1$ ;  $n = 1-3$ ; and the ligands  $CyF_{2y+1-z}Hz$  are the same or different, (2) an org. solvent, selected from org. carbonates, esters, ethers, amides, a sulfur-contg. solvent, and aprotic solvents, and (3) a polymer. The cation ( $Mn^+$ ) can be a metal ion (e.g.,  $Li^+$ ,  $Na^+$ ,  $K^+$ ,  $Rb^+$ ,  $Ce^+$ ,  $Mg^{2+}$ , or  $Al^{3+}$ ), preferably  $Li^+$ , or an org. cation, such as  $NR_4^+$ ,  $[P(NR_2)_kR_{4-k}]^+$  ( $k = 0-4$ ),  $[C(NR_2)_3]^+$ , or  $[CR_3]^+$ . The polymer component is selected from homopolymers or copolymers of vinylidenedifluoride, acrylonitrile, Me (meth)acrylate, or THF (preferably polyvinylidene difluoride).
- IT 206057-04-7 377739-48-5 394692-80-9  
394692-84-3 394692-91-2 394692-92-3  
394692-93-4 394692-94-5 425633-73-4  
425633-74-5 425633-75-6 425633-76-7  
(electrolytes contg.; perfluoroalkyl phosphate salt, org. solvent, and polymer mixts. as electrolytes)
- RN 206057-04-7 ZCA  
CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium, (OC-6-21)-(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 377739-48-5 ZCA

CN Phosphate(1-), trifluorotris(nonafluorobutyl)-, lithium, (OC-6-21)-  
(9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 394692-80-9 ZCA

CN Ethanaminium, N,N,N-triethyl-, (OC-6-21)-  
trifluorotris(pentafluoroethyl)phosphate(1-) (9CI) (CA INDEX NAME)

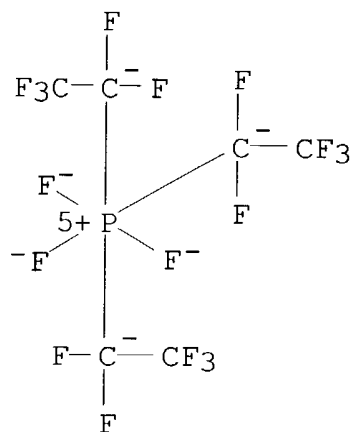
CM 1



CRN 123199-69-9

CMF C6 F18 P

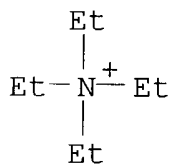
CCI CCS



CM 2

CRN 66-40-0

CMF C8 H20 N



RN 394692-84-3 ZCA

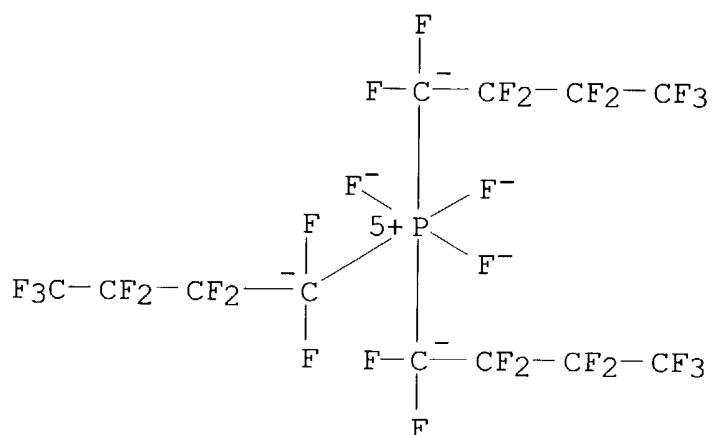
CN Methanaminium, N,N,N-trimethyl-, (OC-6-21)-  
 trifluorotris(nonafluorobutyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 377739-46-3

CMF C12 F30 P

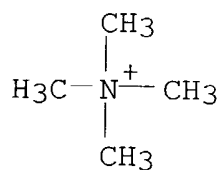
CCI CCS



CM 2

CRN 51-92-3

CMF C4 H12 N



RN 394692-91-2 ZCA

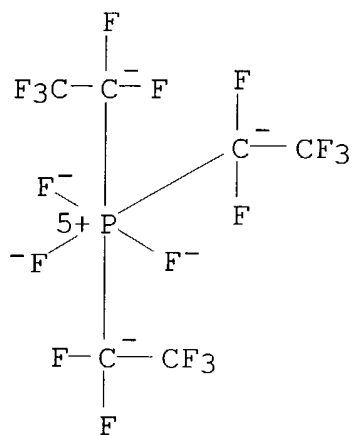
CN Phosphorus(1+), tetrakis(N-methylmethanaminato)-, (T-4)-,  
 (OC-6-21)-trifluorotris(pentafluoroethyl)phosphate(1-) (9CI) (CA  
 INDEX NAME)

CM 1

CRN 123199-69-9

CMF C6 F18 P

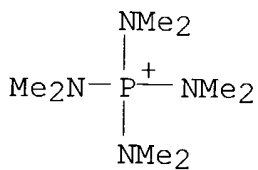
CCI CCS



CM 2

CRN 45050-74-6

CMF C8 H24 N4 P



RN 394692-92-3 ZCA

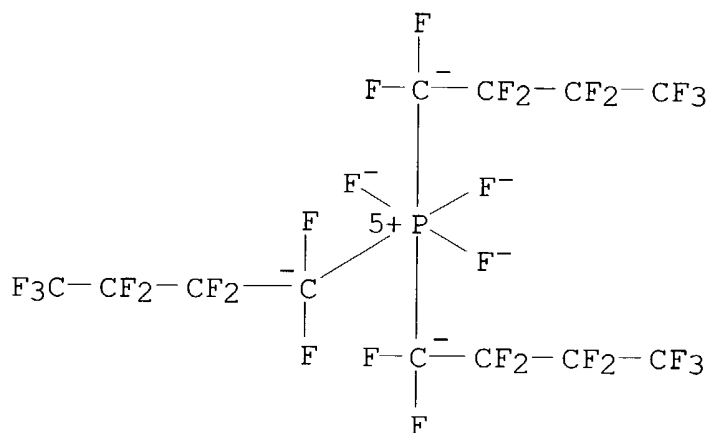
CN Phosphorus(1+), tetrakis(N-methylmethanaminato)-, (T-4)-,  
 (OC-6-21)-trifluorotris(nonafluorobutyl)phosphate(1-) (9CI) (CA  
 INDEX NAME)

CM 1

CRN 377739-46-3

CMF C12 F30 P

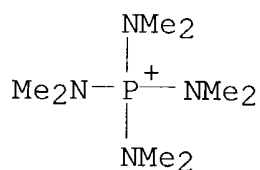
CCI CCS



CM 2

CRN 45050-74-6

CMF C8 H24 N4 P



RN 394692-93-4 ZCA

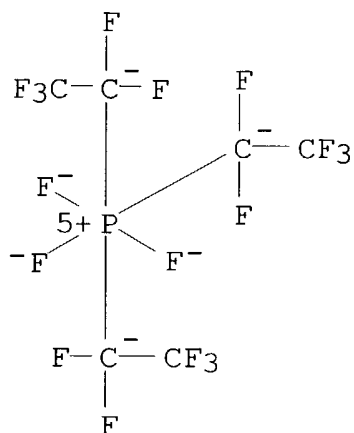
CN Methanaminium, N-[bis(dimethylamino)methylene]-N-methyl-,  
 (OC-6-21)-trifluorotris(pentafluoroethyl)phosphate(1-) (9CI) (CA  
 INDEX NAME)

CM 1

CRN 123199-69-9

CMF C6 F18 P

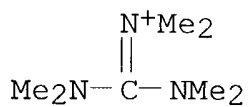
CCI CCS



CM 2

CRN 44872-05-1

CMF C7 H18 N3



RN 394692-94-5 ZCA

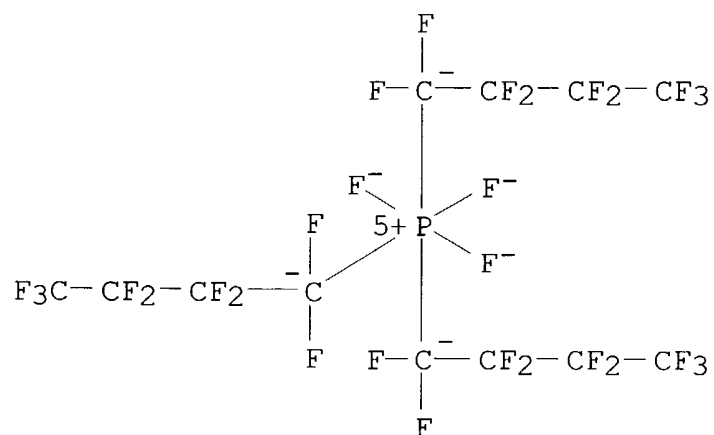
CN Methanaminium, N-[bis(dimethylamino)methylene]-N-methyl-,  
 (OC-6-21)-trifluorotris(nonafluorobutyl)phosphate(1-) (9CI) (CA  
 INDEX NAME)

CM 1

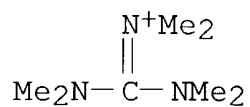
CRN 377739-46-3

CMF C12 F30 P

CCI CCS

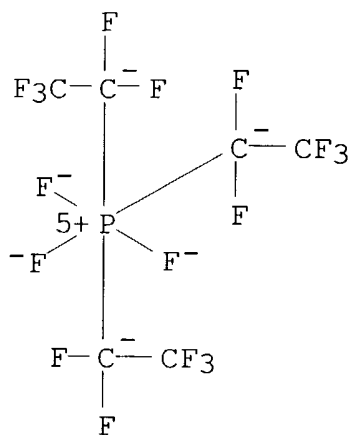


CRN 44872-05-1  
CMF C7 H18 N3



CM 1

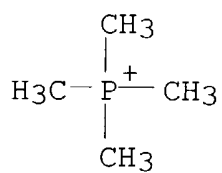
CRN 123199-69-9  
CMF C6 F18 P  
CCI CCS



CM 2

CRN 32589-80-3

CMF C4 H12 P



RN 425633-74-5 ZCA

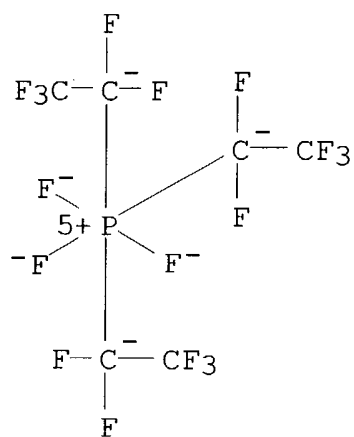
CN Phosphonium, tetraethyl-, (OC-6-21)-trifluorotris(pentafluoroethyl)p  
hosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 123199-69-9

CMF C6 F18 P

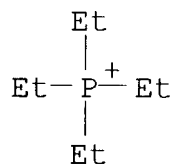
CCI CCS



CM 2

CRN 13983-95-4

CMF C8 H20 P



RN 425633-75-6 ZCA

CN Phosphonium, tetramethyl-, (OC-6-21)-trifluorotris(nonafluorobutyl)phosphate(1-) (9CI) (CA INDEX NAME)

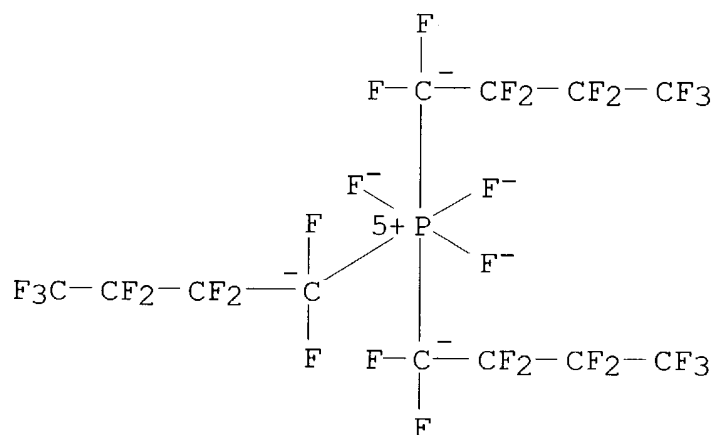
CM 1

CRN 377739-46-3

CMF C12 F30 P

CCI CCS

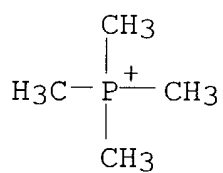




CM 2

CRN 32589-80-3

CMF C4 H12 P



RN 425633-76-7 ZCA

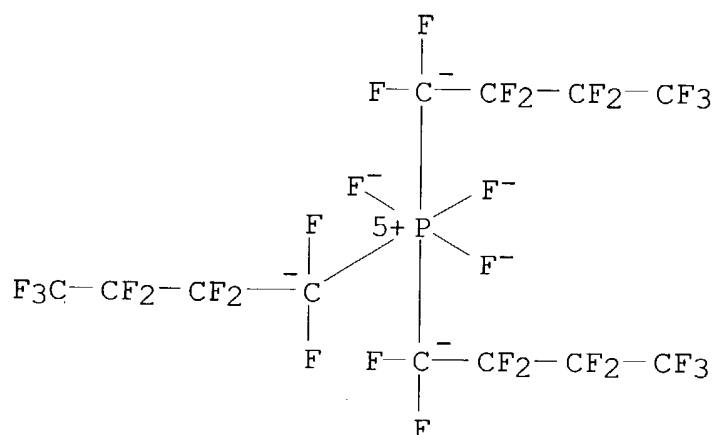
CN Phosphonium, tetraethyl-, (OC-6-21)-trifluorotris(nonafluorobutyl)phosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 377739-46-3

CMF C12 F30 P

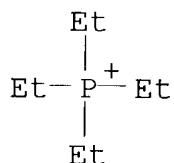
CCI CCS



CM 2

CRN 13983-95-4

CMF C8 H20 P



IT 206057-04-7 377739-48-5 394692-80-9  
 394692-84-3 394692-91-2 394692-92-3  
 394692-93-4 394692-94-5 425633-73-4  
 425633-74-5 425633-75-6 425633-76-7

(electrolytes contg.; perfluoroalkyl phosphate salt, org.  
 solvent, and polymer mixts. as electrolytes)

L25 ANSWER 29 OF 61 ZCA COPYRIGHT 2004 ACS on STN

136:328190 Nonaqueous secondary battery having enhanced discharge capacity retention. Abe, Koji; Ueki, Akira; Hamamoto, Toshikazu (Ube Industries, Ltd., Japan). Eur. Pat. Appl. EP 1199766 A2 20020424, 15 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR. (English). CODEN: EPXXDW. APPLICATION: EP 2001-124312 20011019. PRIORITY: JP 2000-321146 20001020; JP 2000-335946 20001102; JP 2000-363656 20001129.

AB A discharge capacity retention of a nonaq. secondary battery is enhanced by incorporating into its nonaq. electrolytic soln. a small amt. of a substituted diphenyldisulfide deriv. in which each of the

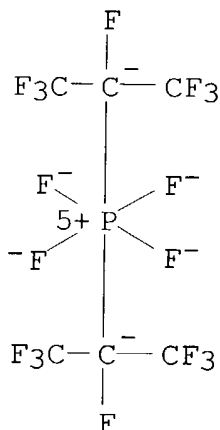
di-Ph groups has a substituent such as alkoxy, alkenyloxy, alkynyloxy, cycloalkyloxy, aryloxy, acyloxy, alkanesulfonyloxy, arylsulfonyloxy, alkoxycarbonyloxy, aryloxy carbonyloxy, halogen, CF<sub>3</sub>, CCl<sub>3</sub>, or CBr<sub>3</sub>. Preferably, a small amt. of Me 2-propylcarbonate, 2-propynyl methanesulfonate, 1,3-propanesultone, divinylsulfone, 1,4-butanediol dimethanesulfonate or cyclohexylbenzene is further incorporated.

IT 205926-54-1 205926-56-3 365454-70-2  
365460-35-1 403699-22-9

(nonaq. secondary battery having enhanced discharge capacity retention)

RN 205926-54-1 ZCA

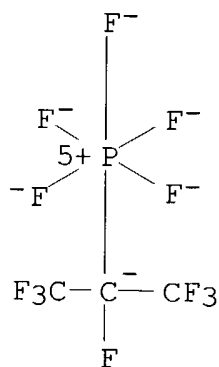
CN Phosphate(1-), tetrafluorobis[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 205926-56-3 ZCA

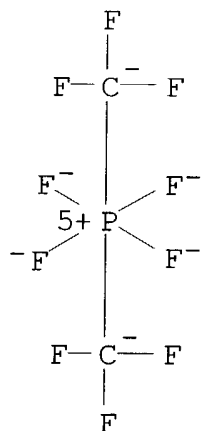
CN Phosphate(1-), pentafluoro[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-, lithium, (OC-6-21)- (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 365454-70-2 ZCA

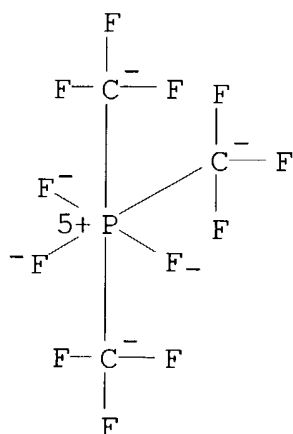
CN Phosphate(1-), tetrafluorobis(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 365460-35-1 ZCA

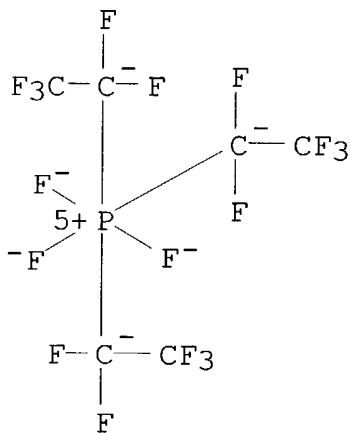
CN Phosphate(1-), trifluorotris(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 205926-54-1 205926-56-3 365454-70-2

365460-35-1 403699-22-9

(nonaq. secondary battery having enhanced discharge capacity retention)

L25 ANSWER 30 OF 61 ZCA COPYRIGHT 2004 ACS on STN

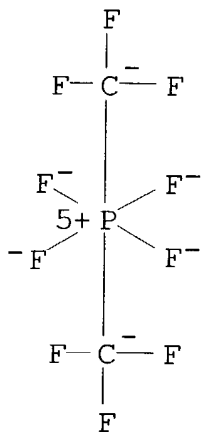
136:234719 Nonaqueous electrolyte secondary lithium battery. Imachi, Naoki; Watanabe, Hiroshi; Oikawa, Satoshi (Sanyo Electric Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2002075441 A2 20020315, 15 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-255825 20000825.

AB In the battery, the electrolytic soln. contains vinylene carbonate as a solvent and  $\text{LiPF}_6\text{-X}(\text{CnF}_{2n+1})\text{X}$  ( $\text{X} = 1\text{-}5$ ;  $n = 1, 2$ ; preferably  $\text{X} = 2, 3$  and  $n = 2$ ) as a solute. The battery shows improved tolerance for overdischarge.

IT **365454-70-2 365454-71-3**, Lithium pentafluorotrifluoromethylphosphate **365460-35-1**, Lithium trifluorotris(trifluoromethyl)phosphate **403694-30-4**, Lithium difluorotetrakis(trifluoromethyl)phosphate **403694-31-5**, Lithium fluoropentakis(trifluoromethyl)phosphate **403694-32-6**, Lithium pentafluoroperfluoroethylphosphate **403694-33-7**, Lithium difluorotetrakis(perfluoroethyl)phosphate **403694-34-8**, Lithium fluoropentakis(perfluoroethyl)phosphate **403699-21-8 403699-22-9**, Lithium trifluorotris(perfluoroethyl)phosphate (nonaq. electrolyte secondary lithium battery contg. lithium perfluoroalkyl perfluorophosphate and vinylene carbonate as electrolyte)

RN 365454-70-2 ZCA

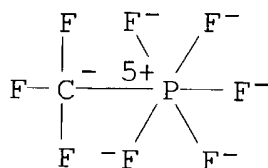
CN Phosphate(1-), tetrafluorobis(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)



●  $\text{Li}^+$

RN 365454-71-3 ZCA

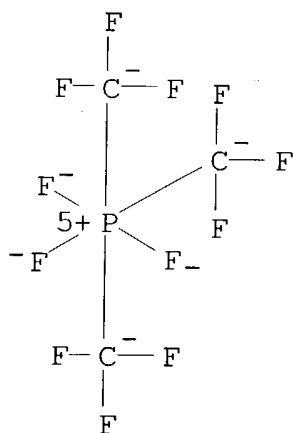
CN Phosphate(1-), pentafluoro(trifluoromethyl)-, lithium, (OC-6-21)- (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 365460-35-1 ZCA

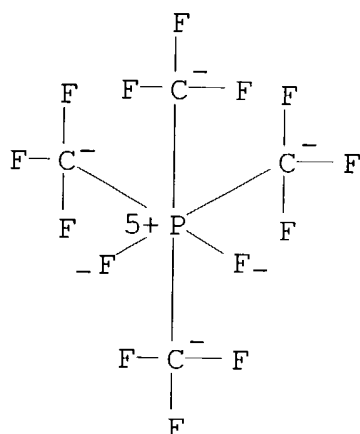
CN Phosphate(1-), trifluorotris(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 403694-30-4 ZCA

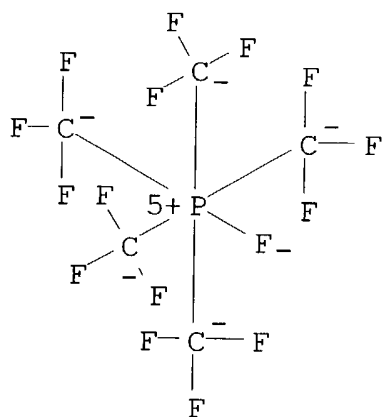
CN Phosphate(1-), difluorotetrakis(trifluoromethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 403694-31-5 ZCA

CN Phosphate(1-), fluoropentakis(trifluoromethyl)-, lithium, (OC-6-22)-  
(9CI) (CA INDEX NAME)

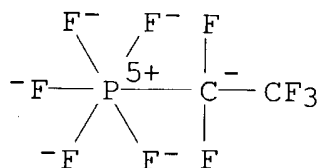


● Li<sup>+</sup>

RN 403694-32-6 ZCA

CN Phosphate(1-), pentafluoro(pentafluoroethyl)-, lithium, (OC-6-21)-  
(9CI) (CA INDEX NAME)

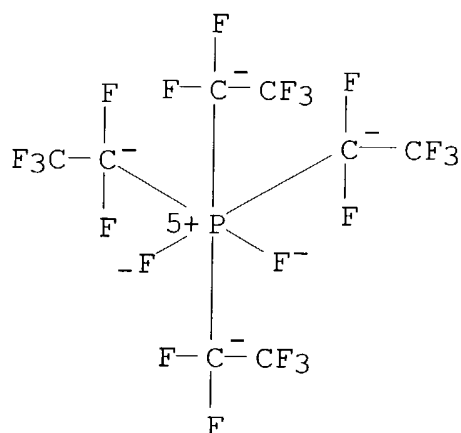




● Li<sup>+</sup>

RN 403694-33-7 ZCA

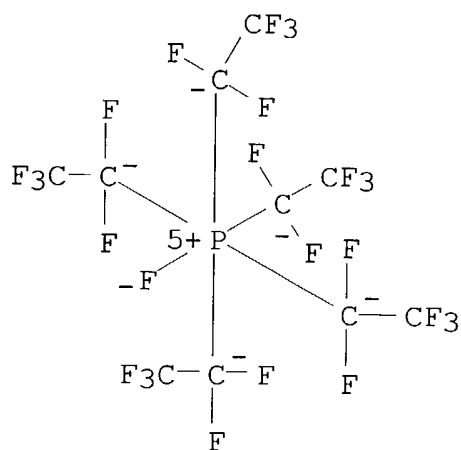
CN Phosphate(1-), difluorotetrakis(pentafluoroethyl)-, lithium (9CI)  
(CA INDEX NAME)



● Li<sup>+</sup>

RN 403694-34-8 ZCA

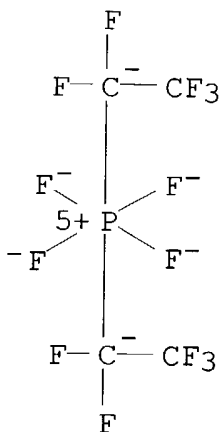
CN Phosphate(1-), fluoropentakis(pentafluoroethyl)-, lithium,  
(OC-6-22)- (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 403699-21-8 ZCA

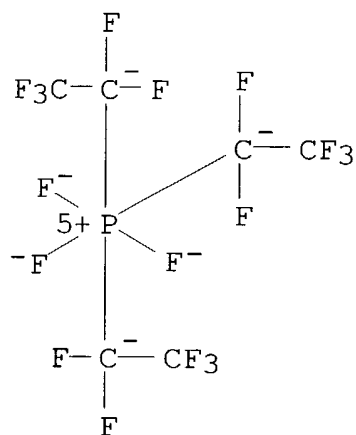
CN Phosphate(1-), tetrafluorobis(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 403699-22-9 ZCA

CN Phosphate(1-), trifluorotris(pentafluoroethyl)-, lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

IT 365454-70-2 365454-71-3, Lithium pentafluorotrifluoromethylphosphate 365460-35-1, Lithium trifluorotris(trifluoromethyl)phosphate 403694-30-4, Lithium difluorotetrakis(trifluoromethyl)phosphate 403694-31-5, Lithium fluoropentakis(trifluoromethyl)phosphate 403694-32-6, Lithium pentafluoroperfluoroethylphosphate 403694-33-7, Lithium difluorotetrakis(perfluoroethyl)phosphate 403694-34-8, Lithium fluoropentakis(perfluoroethyl)phosphate 403699-21-8 403699-22-9, Lithium trifluorotris(perfluoroethyl)phosphate (nonaq. electrolyte secondary lithium battery contg. lithium perfluoroalkyl perfluorophosphate and vinylene carbonate as electrolyte)

L25 ANSWER 31 OF 61 ZCA COPYRIGHT 2004 ACS on STN

136:153902 Secondary nonaqueous electrolyte battery. Takami, Norio; Sato, Satoko (Toshiba Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2002042866 A2 20020208, 8 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-227321 20000727.

AB The battery has a cathode, an anode, and an electrolyte soln. contg. a Li salt dissolved in an org. solvent in a battery case, where the battery case wall is a ≤0.25 mm thick film, the Li salt contains Li<sup>+</sup> and an anion having P, B, or S atom connected to perfluoroalkyl groups, and the solvent have vapor pressure ≤50 mm Hg at 100°.

IT 365454-70-2 365454-71-3

(lithium salts having perfluoroalkyl group contg. anions for electrolytes in secondary lithium batteries)

RN 365454-70-2 ZCA